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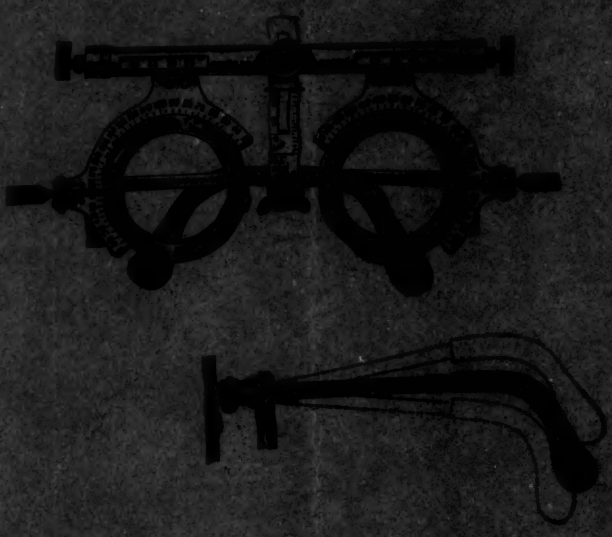

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THE BRITISH JOURNAL

OF

OPHTHALMOLOGY

FEBRUARY, 1947

COMMUNICATIONS

THE PRODUCTION OF A FILTERING CICATRIX IN GLAUCOMA*

BY

SIR RICHARD CRUISE

LONDON

AT long last I have obtained for microscopic examination an eye on which I had performed a successful hinged flap sclerotomy 12 years previously. Mr. Eugene Wolff has cut sections which substantiate the theory on which I have operated for the last 25 years.

The theory was that it was possible to establish permanent drainage from the anterior chamber by means of incisions alone, without excision of any tissue.

This drainage was arrived at by enlisting the assistance of the endothelial cells in the formation of a filtering cicatrix (Fig. 6):

1. The technique consists in dissecting a conjunctival flap up to the limbus as in trephining.
2. A triangular flap of corneo-scleral tissue is cut with its blunt apex attached at the limbus.
3. The conjunctival flap is replaced but *not* sutured.
4. Primary union of the corneo-scleral flap is prevented by massaging aqueous through the incision under the conjunctiva,

* Received for publication, December 14, 1946.

which causes the corneo-scleral flap to ride up and delay approximation of its edges.

5. This massage must be done before 24 hours have elapsed, and continued for a week or ten days, otherwise there will be a tendency to premature union.

6. Primary union is delayed deliberately to enable endothelial cells to proliferate and insinuate themselves between the cut margins at the expense of the normal C.T. cells and form a permeable track through the periphery of the anterior chamber (Fig. 6). It follows then that the greater the length of incision through endothelial lined tissue, compatible with safety from iris prolapse, the more consistent will be the result. My experience is that incisions amounting in linear measurement to 9 mm., formed by a blunt apexed triangle with a 5 mm. base and lateral cuts 2 mm. give the best results.

In the *Trans. Ophthal. Soc. U.K.*, 1940, I described the operation I performed for many years, using a keratome and angled knife for the lateral cuts (Figs. 2 and 3). There was frequently some difficulty in making the lateral cuts owing to the mobility of the small amount of tissue involved and other manipulations, and, in fact, a colleague admitted to me that though appreciative of the results obtained, he did not adopt my method because it was *too difficult*.

As difficulty in the performance of an operation is a serious handicap to its popularity, I have evolved the following technique, which demands the minimum of digital dexterity or risk (Figs. 4 and 5):

1. A flap of conjunctival and subconjunctival tissue is dissected down to the limbus, splitting the cornea for ½ mm.

2. A special hook with a very sharp point is inserted into the corneo-sclera just above the limbus, so as to get a firm hold of the eyeball.

3. The anterior chamber is entered by dissecting through the sclera 1½ mm. from the limbus with a scalpel or Graefe knife for a distance of 5 mm. If the aqueous is permitted to escape slowly the iris does not prolapse. If it does, it can be replaced with a repositor and there will be no tendency for iris protusion when the posterior chamber is empty.

4. While the corneo-scleral lip of the incision is held by the hook, with a pair of sharp-pointed scissors two lateral cuts of 2 mm. are made, one at each end of the incision, and sloped towards each other, so as to make a blunt angled hinge, with the apex towards the cornea.

5. The conjunctiva is replaced but not sutured. If the conjunctival flap is thick, as it is in some cases where there is plenty of subconjunctival tissue, a suture that merely keeps the flap from flopping forward may be inserted, but never pulled tight, as this

would tend to hasten healing. By this means an incision of 9 mm. has been made in endothelial lined tissue, and my experience is that this is adequate to produce an endothelial paved cicatrix with minimal risk of prolapse of the iris.

The late Colonel Herbert in 1907 introduced his operation of flap sclerotomy, whereby he obtained in a certain percentage of cases a filtering scar and permanent reduction of tension. Unfortunately, there was a larger percentage in which no filtration took place, and on account of the unreliability of the results, Colonel Herbert gave it up, and in 1921 substituted a form of iris inclusion with a cystoid scar.

Colonel Herbert explained the results he had obtained in flap sclerotomy as due to a shrinking of the tissue between his incisions, and persevered with what he described as " wedge isolation " for the purpose of obtaining consistent shrinking. The wedge, he stated, " may be likened to a disconnected graft of fibrous tissue . . . . and like any completely separated graft, may be confidently expected to shrink in bulk. The shrinkage should provide for filtration." Herbert's operation with its incisions, which were varied with much ingenuity, was unsuccessful because the basic principle, " shrinkage of tissue," was incorrect.

FIG. 1.

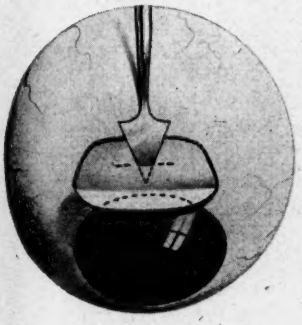


FIG. 2.

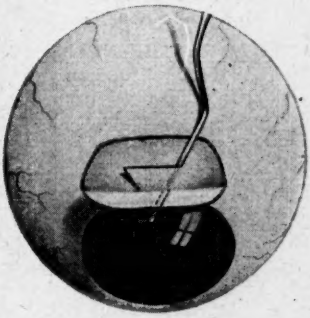
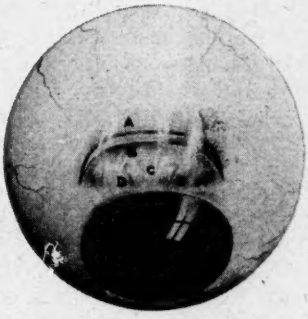


FIG. 3.



Figs. 1, 2, 3. Blocks kindly lent by the Council of the Ophthalmological Society of the United Kingdom.

The question of endothelial cells being responsible for the filtration was never considered, and as far as I am aware endothelial activity has never before been taken into account and deliberately utilised.

Some years later, after an interlude of enthusiastic trephining for glaucoma, my satisfaction with that operation was shaken by two cases of late infection in my private practice. I therefore tried Herbert's operation, without arriving at any consistency in results, while aiming at shrinkage of the isolated wedge of tissue. However, in one case on which I had performed a flap sclerotomy, and which had firmly healed at the first dressing, I opened up the incision subconjunctivally with a repositor, and repeated the performance on two succeeding days. I found that the oedematous area over the incision remained boggy, and was undoubtedly permitting leakage of aqueous. It was obvious that prevention of union and delay in healing was the key to the situation. The only explanation that seemed feasible was, that there must be outgrowth of endothelial cells that would allow aqueous to percolate through the incisions and form a filtering cicatrix (Fig. 6). Later on, in the *Trans. Ophthal. Soc. U.K.*, 1940, before I obtained microscopical proof, I submitted that it was a race between the endothelial and connective tissue cells, and the type of scar, filtering or impermeable, depended on which type of cell predominated in its formation.

I was impressed by a paper by Thomson Henderson, in the "Ophthalmoscope," 1907, on "So-called filtering cicatrices in the treatment of glaucoma." He poured scorn on the possibility of such an occurrence, stating that "the endothelium seals the inner margin of the incision and that it is this endothelium that precludes all possibility of a permanent filtering cicatrix following any operative incision, however devised." This statement was histologically correct for *normal* healing.

However, accompanying his paper is a very instructive illustration of the normal healing of a limbal incision taken from a case that died suddenly 8 days after operation. This shows the endothelium growing forward into the irregular posterior margin of the corneal incision to meet the fibrinous plug that was forming primary union. It occurred to me that if this fibrinous plug could be prevented from consolidating and interference with normal healing deliberately achieved, enterprising endothelial cells, unable to bridge a gap, would tend to grow into, and line, the gap. My aim has been to prevent normal healing by deliberately keeping the incisions apart; this is achieved by massage, which expresses the aqueous under the conjunctival flap, and thereby raises the hinge flap of corneo-scleral tissue with its endothelial lining. This gives time for the endothelial cells to proliferate and line the margins of

the incisions, and instead of " sealing " off the incisions, renders them permanently permeable.

Now that there has been histological verification of my clinical hypothesis, I feel I am justified in strongly advocating the hinge flap sclerotomy as the operation of choice in cases of chronic glaucoma.

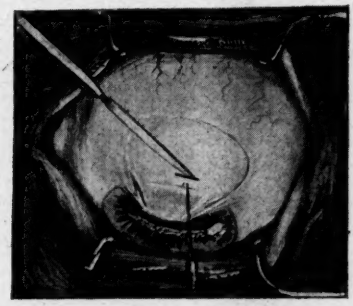


FIG. 4.

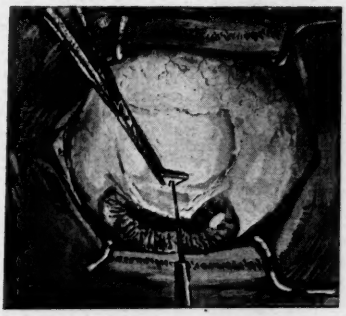


FIG 5.

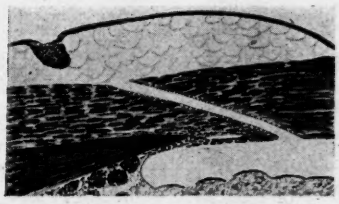


FIG. 6.

Scheme as suggested to R.C. to indicate method by which sclerotomy produces permanent drainage. Note endothelial lined track.

For 25 years I have aimed at utilising the endothelium of the anterior chamber as my accomplice in committing an offence against nature, that is, the prevention of the normal healing by primary union of every incision into the anterior chamber, without excision of any tissue.

The evidence supplied by the regular periodic visits of cases in one's private practice where alone accurate tonometric observation

FIG. 7.

Low power view of the area of drainage, with a portion of the track leading from it.

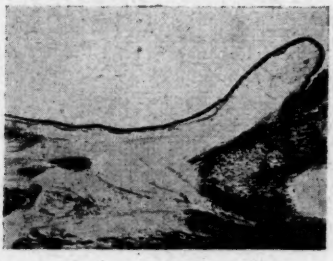


FIG. 8.

Portion of Fig. 7 under higher power.

can be maintained over periods varying from 6 months to 25 years, fortifies me in my conviction that the " offence " has been justified.

I have to thank my late House Surgeon, Mr. Dermot Pierse, for his excellent drawings of the operation, and for his comment, "I hope your paper will have the desired effect of changing the views of the many die-hard trephine enthusiasts. I am very satisfied with the results I obtain from the operation."

Mr. Boxill, another House Surgeon, is not less enthusiastic. Evidence from successive generations of House Surgeons, with

their varied experience of various surgeons, and their ill-concealed intolerance of any misadventures by their seniors, is not a negligible criterion.

The eye which is the subject of histological investigation by Mr. Eugene Wolff, was obtained by a most fortuitous chain of circumstances within 3 hours of the death of the patient. It was noted at the time of the removal of the eye that aqueous could be expressed from the anterior chamber into the subconjunctival tissues. The eye was fixed in Zenker and serial sections cut in celloidin. The sections were stained with haematoxylin and eosin, van Gieson, Mallory's triple stain, Mallory's phosphotungstic acid haematoxylin and Verhoeff's elastic tissue stain.

The boggy area of filtration is covered by thinned conjunctival epithelium containing two to four layers of nuclei (Figs. 7 and 8). It is limited above by a characteristic papillary-like thickening of the epithelium. The drainage area itself is largely filled with a very delicate spongework of connective tissue with here and there some fine fibres which stained like Descemet's membrane.

The actual track in the corneo-sclera also was not empty as might be thought from haematoxylin and eosin stained sections. But sections stained with Mallory's triple stain show it to be filled

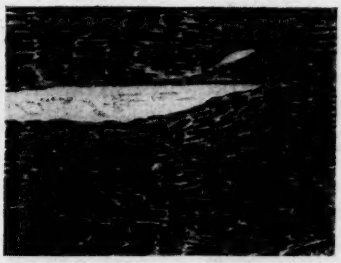


FIG. 9.

Drawing of a portion of the track to show endothelial lined and bare areas.

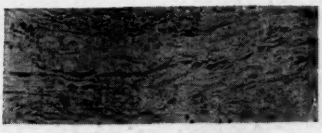


FIG. 10.

Microphotograph of portion of the track to show endothelial lining.

with the same spongework of very delicate connective tissue as the drainage area. Here and there also are some spots of pigment.

The walls of the track are in part lined by very definite endothelium (Figs. 9 and 10), while in others the sclera is bare, and it is a very remarkable feature that where the sclera is bare it has apparently undergone no change since the day the incision was made some twelve years ago.

In many of the sections a portion of Descemet's membrane is seen (Fig. 9). This is no doubt due to the fact that Descemet's membrane tends to curl forwards when cut.

Comment

An endothelial lining to filtering scars is usually denied but there can be no doubt of its presence here. The fact that the sclera has shown no signs of healing appears to bear out Thomson Henderson's theory that tissues bathed by the aqueous are not stimulated to show the usual signs of repair.

THE FLAP SCLEROTOMY IN THE TREATMENT OF GLAUCOMA*

BY

W. M. DE C. BOXILL

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SINCE the introduction of a similar operation by the late Colonel Herbert in 1907, but based on an erroneous hypothesis, the technique of the flap-sclerotomy appears to have been considerably varied by those few who, in the past, have used it in the treatment of chronic primary glaucoma. The technique, which will later be described, has arisen through the work of Sir Richard Cruise at the Royal Westminster Ophthalmic Hospital during his long and successful association with that hospital, and it is through the efforts of this great master of the simple extraction operation for cataract that an even simpler method of permanent decompression of the hypertensive eye has been evolved.

In the past this operation has mostly been confined to cases of chronic glaucoma particularly the primary ones. Recently it has been performed with success on acute congestive hypertensive eyes which did not respond to medical treatment. The technique in both

* Received for publication, January 2, 1947.

cases being the same with the pre-operative treatment varied accordingly.

The factors in favour of this operation apply equally to both acute and chronic cases which require operative treatment. They are as follows :—

(*a*) This is the least traumatic of all the operations for ocular decompression. No tissue is excised. An iridectomy is unnecessary and therefore avoided, hence there is no haemorrhage into the anterior chamber with the subsequent passage of blood admixed with aqueous into the sclero-corneal wound thereby facilitating its blockage and early closure;

(*b*) Slow decompression of the anterior chamber;

(*c*) The permanent incisions into the angle of the anterior chamber are covered by a flap of conjunctiva and Tenon's capsule and therefore protected from the conjunctival sac. The advantage of this in the acute case with a potentially dirty conjunctival sac is clear;

(*d*) It is an easy operation to perform.

The pre-operative treatment is slightly different in the two types of case. In the primary acute eye, operative treatment is generally adopted when the pupil and tension do not respond to intensive treatment with miotics, heat, etc. It seems likely that here the corneal oedema is so great that miotics are unable to pass through the oedematous barrier in sufficient concentration to be effective. At this stage, when it has been decided to adopt surgical measures, a retro-bulbar injection of 1 c.c. of 3 per cent. novocaine is given through the lower lid with a $1\frac{1}{4}''$ needle and the commencement of the operation delayed until the tension is lowered sufficiently for the corneal oedema to clear and the pupil to respond to miotics which are now able to pass through the cornea in effective concentration, also the conjunctiva by now is less congested and the slight bleeding which is subsequently encountered at operation is easily controlled. Furthermore, as the cessation of pain rapidly follows the retro-bulbar injection, the apprehension of the patient is lessened and the operation can proceed under conditions approximating those prevailing with a cold case.

If 1 c.c. of 3 per cent., novocaine is not sufficient, which is rare, the injection can be repeated giving $\frac{1}{2}$ c.c. at a time until the condition of the eye is such that operative procedure can be undertaken under ideal conditions.

As the conjunctival sac is potentially dirty, just prior to the operation it is washed out with a sterile warm solution of normal saline and guttae penicillin 500-1,000 units per c.c. in normal saline instilled. Penicillin drops can also be used during the period of medical treatment with miotics, etc.

With regard to the giving of a retro-bulbar injection to an eye

whose extra-ocular tissue is very congested, there are some who would say that the dangers of intra-orbital haemorrhage following this injection are greatly increased when it is given in this type of case, however, assurance has been obtained by no less an authority than Mr. Eugene Wolff of the Royal Westminster Ophthalmic Hospital, that there is no increase in the occurrence of intra-orbital haemorrhage providing the injection is given with a needle not more than $1\frac{1}{4}$ in. in length and in practice, so far, this dreaded complication has not arisen.

In the case of chronic primary glaucoma, the pre-operative requirements are both few and simple. Eserine $\frac{1}{2}$-1 per cent. is frequently instilled into the conjunctival sac 1-$1\frac{1}{2}$ hours before the operation so that the pupil is as small as possible and well under the influence of this drug, also, guttae pantocaine 1 per cent. at frequent intervals $\frac{1}{2}$-$\frac{3}{4}$ hour before the operation to ensure good anaesthesia.

In the theatre $\frac{1}{2}$-$\frac{3}{4}$ c.c. of 3 per cent. novocaine is injected sub-conjunctivally in and around the tendon of insertion of the superior rectus muscle. The advantages of this injection are :

(*a*) Paralysis of the superior rectus muscle to prevent the patient looking upwards during the operation.

(*b*) Increase of the anaesthesia of the conjunctiva and Tenon's capsule in the immediate area of operation.

This injection is not usually required when dealing with an acute case if the retro-bulbar injection has been given into the muscle cone around the ciliary ganglion and time enough has been allowed to elapse for its anaesthetic and paralytic action to have full effect. However, $\frac{1}{4}$-$\frac{1}{2}$ c.c. of 3 per cent. novocaine with 1 minim of adrenalin 1/1,000 added may be injected sub-conjunctivally around the insertion of the superior rectus muscle in those acute cases where the conjunctival vessels are excessively congested, in order to reduce bleeding when the conjunctival flap is being cut.

The technique of the operation is as follows :

A small snip is made into the conjunctiva and Tenon's capsule about 6 mm. directly above 12 o'clock on the cornea, this snip is then extended medially and laterally and for an equal distance on both sides of the original snip so that an incision is obtained which is roughly 1-$1\frac{1}{2}$ cms. in length and is parallel with the limbus. This flap composed of the above two structures is then turned downwards and gradually dissected off the sclera using non-toothed forceps for fixation and blunt nosed conjunctival scissors for the dissection until about 2 mm. from the sclero-corneal junction, when sharp-pointed scissors are substituted to complete the dissection. The actual snips made in this region should be as near to the sclera as possible; if not the conjunctiva may be button-holed, for in this region the conjunctiva, Tenon's capsule and episcleral tissue are

fused and therefore not as easily raised from the sclera as has been previously encountered. During this part of the dissection the sclero-corneal junction is reached and recognised by the sharp demarcation of the grey tissue of the cornea and of the white sclera; the junction where these two meet may be referred to as the " grey line."

When the " grey line " is reached, which usually first appears in the centre of the dissection, the dissection is then carried laterally and medially with sharp-pointed scissors so that the " grey line " is exposed for about 4-5 mm. As soon as this step has been completed, a Tooke's corneal splitter is used to carry the dissection forwards in the same plane in order to separate the corneal tissues the whole length of the exposed " grey line " and for a distance of 1½ mm. in front of it; the raised portion of corneal tissue remaining in continuity with the previously raised conjunctival flap above and the cornea below.

The above dissections having been completed, oozing episcleral and conjunctival vessels should be dealt with in order to provide a clean dry field in preparation for the incisions now to be made into the scleral and corneal tissues. The conjunctival flap is now turned downwards on to the cornea with its conjunctival surface in apposition with the anterior surface of the cornea: the assistant steadying the flap with a small swab soaked in normal saline and held between the tips of non-toothed forceps; the swab being applied to the Tenon surface of the flap, traction being gently applied in a downward direction, but without exerting pressure on the eye.

There is now an area of the outer surface of the angle of the anterior chamber exposed for the permanent incisions which are to be made in this situation, but before commencing these incisions, it is essential that perfect fixation of the eye is assured. Of the many methods of fixation, the aim of which is to render the eye immobile without exerting external pressure upon it, the one which has been found to answer these requirements is by the use of the scleral hook, whereby the superficial scleral fibres are picked up by passing a small sharp pointed hook beneath them. The hook most commonly used in this operation is the Cruise scleral hook (John Weiss and Co.) which has been specially designed for this operation.

The next step in the operation is the insertion of the scleral hook, the place of insertion being along the " grey line," the points of entrance and exit of the hook being approximately on either side of, and equidistant from, 12 o'clock on the cornea, the distance between these points being about 1-1½ mm. With the scleral hook in situ and held by the free hand of the operator, an incision is now made with a small scalpel or Graefe knife into the sclera 5 mm. long and 1 mm. from and parallel to the " grey line," the mid-point of the incision being approximately opposite 12 o'clock on the cornea.

Since the sclera extends for a distance of 2 mm. from the anterior extremity of the ciliary body to the sclero-corneal junction in this upper portion of the anterior chamber, the base incision just mentioned is therefore placed 1 mm. in front of the root of the iris, so that neither this tissue nor the ciliary body is in danger of injury when the knife enters the anterior chamber; furthermore prolapse of the iris is less likely to occur than if the incision was placed further back. As the aim of the incision is to make a linear opening into the angle of the anterior chamber the whole thickness of the sclera has to be traversed throughout the entire 5 mm., hence it would be impossible to complete it with one stroke of the knife without sudden entry into the anterior chamber with consequent injury to the iris and particularly the lens, therefore, the incision is made with a series of cuts all in the same place and all of the same length, until the anterior chamber is entered, this usually taking place by a small opening in the centre of the wound. The cutting edge of the knife should *always be perpendicular* to the antero-posterior curve of the sclera to avoid making a sloping incision with bevelled edges which tends to separate the superficial scleral fibres of the anterior portion of the wound which would make for difficulty in completing the inner portion of the incision.

The anterior chamber now having been entered at a small point in the centre of the wound, there is a slow leakage of aqueous from it and therefore slow decompression is achieved. As soon as the anterior chamber has been decompressed, the point of the knife is inserted into the small opening with the cutting edge directed upwards and the inner portion of the incision completed medially and laterally.

It is during the decompression of the anterior chamber and the subsequent enlargement of the inner portion of the incision that the complication of prolapse of the iris may occur; but providing the knife is sharp and little pressure has been used in making the cuts, the use of the scleral hook for fixation to avoid further pressure on the globe and the sphincter pupillae is well under the influence of the previously administered miotic, this complication seldom arises. If it does occur the iris can usually be reposited and this should be done before continuing. Very occasionally the iris will not remain inside the anterior chamber after many repositings; in this event a peripheral iridectomy will prevent the iris from making further appearances into the lips of the wound; however, as this complication will not arise if the above precautions are taken, one of the previously mentioned main points in favour of this operation will not have been missed.

Fixation still being maintained with the scleral hook *in situ*, but now held by the assistant, the operation is continued by making two forward cuts in the sclero-corneal tissue; these are made with small

sharp pointed straight or curved scissors. Each of these forward cuts commences at the extremities of the original incision making an angle with it of approximately 45 degrees and extending forwards for 2 mm., that is, 1 mm. of sclera and 1 mm. of cornea compose each cut. A triangle comprised of the two tissues is thus formed with a 4 mm. base of scleral tissue and two sides each 2 mm. in length containing equal portions of sclera and cornea. The distal ends of these two forward cuts do not completely meet so that the apex of the triangle is not completed and a small portion of corneal tissue is left in continuity with the rest of the cornea, resulting in mobility of the triangle only in a vertical direction.

Just prior to commencing these forward cuts the tip of an iris repositor is kept between the lips of the base incision by the free hand of the operator until the cuts are completed in order:

(*a*) to separate the lips of the incision so that the point of the scissors may be introduced into the wound without difficulty when commencing and completing each forward cut,

(*b*) to keep the iris away from the point of the scissors,

(*c*) to ensure against the iris prolapsing at this stage.

In those cases where there are peripheral anterior synechiae at the apex of the triangle these adhesions may sometimes be broken down with a repositor; at other times the adhesions may require division with scissors, thereby freeing the iris from the posterior surface of the cornea. A repositor should then be passed into the anterior chamber to ensure that free communication has been established between it and the triangular opening in its angle. The operation is completed by removing the scleral hook and repositing the conjunctival flap under the upper lid. No sutures are inserted into this tissue so that no tension is exerted upon it with subsequent pressure and closure of the triangular valve beneath it.

The immediate instillation of eserine ½ per cent. in both acute and chronic cases prior to bandaging the eyes, is in the opinion of the writer a safeguard against prolapse of the iris during the 24 hours before the first dressing when the anterior chamber is attempting to reform. Atropine sulphate 1 per cent. should be instilled at the first dressing and at successive 24 hourly dressings until digital massage of the globe is commenced; the use of atropine here being solely to raise the intra-ocular pressure behind the mobile triangular flap of sclero-corneal tissue, thereby helping to keep it open.

The time to institute gentle digital massage being when the conjunctival flap has completely sealed off and there is no leakage of aqueous into the conjunctival sac; this may be ascertained by the daily instillation of fluorescein. If massage is employed before, there may be a sudden rush of aqueous through the permanent

incisions taking with it the iris and probably necessitating further surgical interference in the form of an iridectomy. On the other hand once the conjunctival flap has healed, there is sufficient back pressure on the aqueous in the anterior chamber to prevent its sudden escape through the triangular opening; there is now no danger of the iris prolapsing.

As soon as massage has been started it may be carried out once or twice daily during the post-operative period to ensure the passage of aqueous through the opening and to prevent healing occurring at its edges. The patient is allowed up at this juncture and can usually be discharged around the tenth day. He is instructed to massage the eyeball gently daily through the lower lid and is seen at weekly intervals until it has become obvious that a permanent filtering cicatrix has been produced; at this stage massage is discontinued.

OPHTHALMO-NEUROLOGICAL SYMPTOMS IN CONNECTION WITH MALIGNANT NASOPHARYNGEAL TUMOURS*†

BY

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MR. CHAIRMAN, Ladies and Gentlemen,

I feel greatly pleased and honoured to be allowed to speak before this dignified audience and thus to re-establish the connection between British and Danish ophthalmology, a connection which was previously so intimate and profitable. Danish ophthalmologists, among whom the best known are Bjerrum, Tscherning, Edmund Jensen, Heerfordt, Lundsgaard, and Roenne, are greatly indebted to British ophthalmologists, whose best known representatives with us are men like Young, Mackenzie, Bowman, Priestley-Smith, Marcus Gunn and Duke-Elder.

During the gloomy years of German occupation Danish ophthalmology greatly missed the inspiration from British ophthalmology. Now that I stand here as the first Danish speaker after the war I

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naturally call to mind the heroic contribution made by the English towards the liberation of my native country, for which we are all very grateful, and this will never be forgotten.

Realising the importance for us in Denmark of the re-establishment of this connection I thank you for your kind invitation to the present meeting, and I hope I shall not betray the trust reposed upon me by the Society.

As the subject of which I want to speak has been dealt with but rarely in British literature, I hope to be able to bring forward for discussion facts which are little known to you.

Introduction

An account of the ophthalmo-neurological symptoms in connection with malignant nasopharyngeal tumours must necessarily include a description of other important features of the symptomatology to give the right idea of the position in the nosography of the ophthalmo-neurological symptoms.

An increased interest, though varying in degree, has been taken in malignant nasopharyngeal tumours since the introduction, about 100 years ago, of the postrhinoscopic speculum examination, through which it has become possible to diagnose diseases in the nasopharynx. This interest has been further stimulated within the past few decades on account of the results obtained from modern radiological treatment, which to-day is capable of curing these deep-seated and generally inoperable tumour forms. The increased interest is, however, due to other facts as well, thus for instance to the fact that these tumour forms have proved to be of more frequent occurrence than they were previously supposed to be, and that the disease is very often misjudged.

The cause of this misjudgment may to a certain extent be explained from the variety of the clinical picture, which but rarely conveys the idea of a malignant neoplasm in the nasopharynx. That a no small number of patients are young persons often in sound general health likewise contributes to this fact.

The widely different symptoms or combinations of symptoms imply, besides applications to general practitioners, also examinations of the patients by various specialists often at rather early stages, thus by ophthalmologists, neurologists, oto-rhinologists, surgeons, neurosurgeons, internists and radiologists.

If the idea of a malignant nasopharyngeal tumour in the case in hand does not occur to the examining physician and the time for the making of the right diagnosis is delayed, by which valuable—perhaps life-saving—time is wasted for the patient.

Historical data

I shall abstain from a detailed historical review of the literature in hand. Only I want to mention that the nosographical pioneer works are due chiefly to French writers (Escat, Laval, Jacod), and in England to Trotter, while most of the modern comprehensive descriptions come from America (New and others).

Nasopharyngeal tumours were the order of the day at the International Medical Congress in London, 1913. But very little was said about ophthalmological symptoms.

Frequency, histopathology, age and sex incidence

The malignant nasopharyngeal tumours, though of somewhat infrequent occurrence are by no means rare. Thus over 2,000 cases have now been published in the literature, and personally I managed to collect 454 cases over a period of ten years from the four Scandinavian radiological clinics. The following numerical statements are based on these latter cases.

The four radiological clinics from which the cases under review are derived are as follows: *Radiumhemmet*, Stockholm and the Radiological Clinics of Lund, Copenhagen, and Aarhus, which together cover a population corresponding in size to that of London (about 7½ million people). The frequency of malignant nasopharyngeal tumours constituted here 1 per cent. of the total number of cancer cases, *i.e.*, a frequency of the same relative magnitude as that of choroidal melanosarcoma. As, however, only the cancer cases that are likely to respond to irradiation are referred to the radiological clinics, we must make a correction for this percentage to attain to the frequency among the total number of cancer cases in the population. The figure then arrived at is 0·4 per cent. of all cases of cancer.

A bare two-fifths (38 per cent.) of the patients presented ophthalmo-neurological symptoms, a figure which varied but little from one year to the other. —

Histopathological examinations revealed both carcinomata and sarcomata, in conformity with the fact that malignant nasopharyngeal tumours proceed from the mucous membrane and the lymphatic tissue in the nasopharynx. I shall not go into details regarding these facts, but only just mention that the majority of the tumours were anaplastic tumours of low differentiation. Most common were squamous epithelial carcinomata and reticulum-cell sarcomata, which occurred equally often. The undifferentiated tumours and those of low differentiation constituted four-fifths of the cases, while the differentiated tumours, *i.e.*, squamous epithelial carcinomata undergoing cornification constituted one-fifth.

As to the *age incidence* (Fig. 1) all age-classes from 4 to 79 were represented, but half of the patients were found within the age-classes of 41 to 60. It is, however, worth noting that *one-fourth of the patients were 40 years of age or younger*. The average age was 49. When cases of carcinoma and sarcoma were taken separately the average age was somewhat higher for carcinomata than for sarcomata.

For no discoverable reason there were twice as many men as women both among the carcinoma cases and among the sarcoma cases.

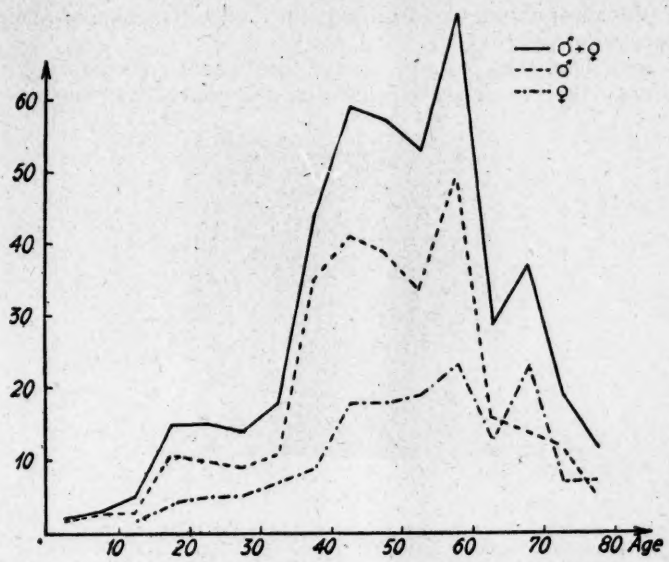

FIG. 1.

Age-curves for 454 cases of malignant nasopharyngeal tumours.

Symptomatology

The symptomatology can roughly be divided into four well-characterised groups:

(1) *Ophthalmo-neurological symptoms* due to the infiltrative growth of the primary tumour or its metastases into the base of the skull and adjacent regions,

(2) *rhinological* and

(3) *otological symptoms* due to the exophytic growth of the primary tumour into the nasopharynx with influence on the Eustachian tube,

(4) *enlarged cervical glands* in consequence of lymphogenous metastases.

I shall here give a brief survey of the manner of growth of the tumours and of the topographical anatomy of the affected areas, because the understanding of the symptomatology of the malignant nasopharyngeal tumours, in particular the ophthalmo-neurological symptomatology, rests to a great extent on a knowledge of these facts.

The most frequent *point of origin of the primary tumour* is the lateral wall of the nasopharynx, especially the lymphatic tissue of the tubal tonsil (half of the cases). Next in frequency follows the

roof (the nasopharyngeal tonsil, one-third of the cases), and finally the posterior wall (Fig. 2).

A characteristic feature of the malignant nasopharyngeal tumours is their tendency to *infiltrative and destructive penetration*

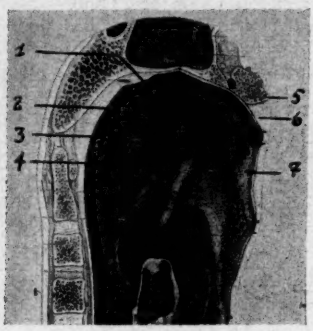

FIG. 2.

The nasopharynx seen from behind and from the right side with the characteristic relief: pharyngeal tonsil (1), tubal tonsil (2), tubal ostium (3), Rosenmüller's pharyngeal recess (4). The soft palate (7) and the posterior border of the nasal septum (5) bound the choanae (6). (After *Testut*).

into the adjacent areas, partly the *parapharyngeal space and* partly the *base of the skull.* The tumour either follows the foramina already present or grows with osseous perforation. The parts of the base that are particularly exposed to invasion are (Fig. 3)

FIG. 3.

The limit of the nasopharynx on the external base of the skull appears from the dotted white line running between the foramen lacerum (4) and the foramen ovale (3). To the left in the picture the nasopharyngeal wall is drawn (2) with a neoplasm arising from the tubal ostium (1). (The Fig. modified after *Canuyt*).

naturally those which lie along the line of demarcation between nasopharynx and base of the skull, which is marked by the place of insertion of the pharyngo-basilar fascia. This area is seen to

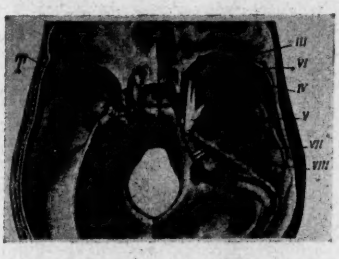

FIG. 4.

Internal base of the skull. The Roman numerals indicate the numbers of the brain nerves. To the left (T) there is seen a nasopharyngeal tumour invading the middle cranial fossa through the foramen lacerum! (*Canuyt*).

comprise parts of the body of the sphenoid bone, the basilar portion of the occipital bone, as well as the apex of the pars petrosa. These three osseous portions encompass the foramen lacerum. When the tumour tissue grows up through the foramen lacerum it reaches the internal base of the skull in the middle cranial fossa (Fig. 4) with intimate relation to the cavernous sinus and the cranial nerves situated in this place, that is III, IV, V, and VI (Fig. 5). Pressure or direct penetration into the nerves will then bring about increasingly severe lesions particularly of the abducens

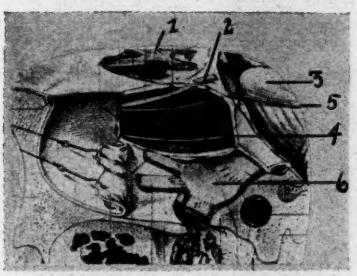

FIG. 5.

Left middle cranial fossa with the cavernous sinus open, seen from the side. Superiorly the optic chiasma (1) and the third nerve (2), under which the thin fourth nerve (5) running along the mesencephalon (3). Further the sixth nerve (4) and the Gasserian ganglion (6) with the ramifications (after *Testut*).

and the trigeminus, resulting in eye muscle paralyses and varying degrees of trigeminal neuralgias or disturbances of sensibility, and possibly paralysis of the muscles of mastication (Figs. 6 and 9).

FIG. 6.

Internal base of the skull of a female, aged 29 years (case 141), presenting a large tumour invasion through the body of the sphenoid bone (destruction of sella and pituitary) and left cavernous sinus from a nasopharyngeal reticulum-cell sarcoma. Clinically there was found left ophthalmoplegia and amaurosis.

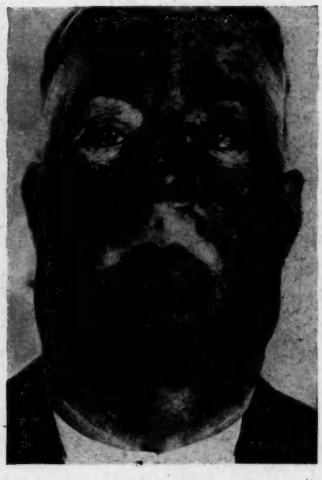

FIG. 7.

Male, aged 56 years (case 81), with left paralysis of the sixth cranial nerve (of one month's duration) and bilateral cervical glands from squamous cell carcinomas on left Eustachian tube.

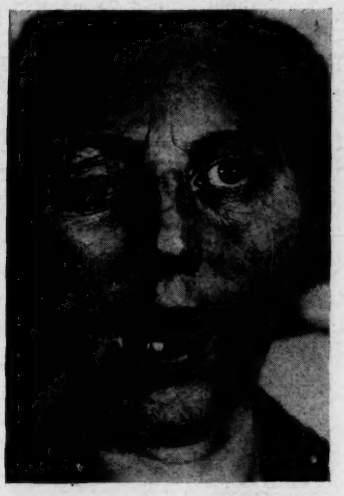

FIG. 8.

Female, aged 40 years (case 83) with right paralysis of the third cranial nerve (of two month's duration). No metastatic cervical glands. Destruction of the base of the skull verified by X-rays. In the nasopharynx a reticulum cell sarcoma proceeding from right tube.

FIG. 9.

Boy, aged 5 years (case 84) with right total ophthalmoplegia (developed through two months) and nasal stenosis (of five month's duration) as well as right cervical glands (of one year's duration) from malignant nasopharyngeal tumour, presumably reticulum-cell sarcoma.

If the tumour grows upwards and forwards the visual pathway will be injured, and this will result in visual disturbances in the forms of impairment of vision, defects of the field of vision, and different ophthalmoscopical findings, such as choked disc or atrophy.

In cases where the tumour penetrates through the superior orbital fissurethere will occur exophthalmos (Fig. 10), which may, however,

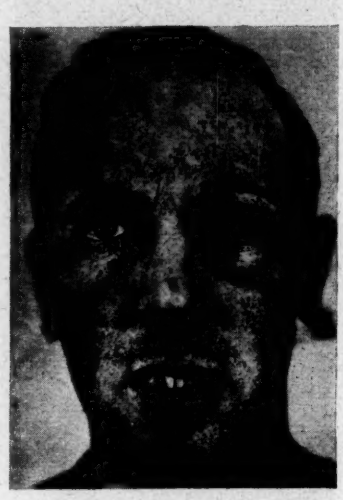

FIG. 10.

Male, aged 24 years (case 30) with excessive left exophthalmos and chemosis developed in the course of two months by a reticulum cell sarcoma from the nasopharynx invading the orbit. Cervical gland metastasis the size of a hazel nut (left).

also be due to orbital invasion through the inferior orbital fissure through the parapharyngeal space.

The simultaneous occurrence of ophthalmoplegia, optic tract lesion with amaurosis, and trigeminal neuralgia has been described by Jacod as *syndrome carrefour petrosphénoidale* and is regarded as pathognomonic of malignant nasopharyngeal tumours.

Penetration of the tumour into the parapharyngeal space in the direction towards the jugular foramen and the hypoglossal canal will bring about different radial symptoms from the cranial nerves running in this area, *i.e.*, IX, X, XI, and XII, with paraesthesias and paralyses of pharynx, palate, larynx, and tongue.

The truncus sympatheticus can be injured partly in this place

FIG. 11.

Male, aged 42 years (case 69) with ipsilateral (right) *Horner's* syndrome (of six month's duration), paralysis of the sixth cranial nerve (of two month's duration, and cervical glands (of three month's duration) from reticulum-cell sarcoma proceeding from the tube (presumably).

and partly intracranially (paratrigeminally), or in its cervical portion with the development of Horner's syndrome (Fig. 11).

Paresis of the seventh cranial nerve, with or without attending eighth nerve lesion, may occur by growth of the tumour in the direction towards the porus acousticus internus; but more often the seventh cranial nerve is injured about its point of exit from the facial canal at the stylomastoid foramen.

All these symptoms are at their initial stages due to pressure from the tumour tissue, but later also to irreversible destructions. That is the reason why nervous symptoms are often seen to improve after irradiation at the initial stages.

Since *these ophthalmo-neurological symptoms* may be the *first and only symptoms of a nasopharyngeal tumour,* it is no wonder that such cases are often mistakenly diagnosed and treated symptomatically for eye muscle paralyses or trigeminal neuralgia for a considerable length of time without the slightest effect.

The *rhinological and otological* symptoms in connection with malignant nasopharyngeal tumours are, as mentioned already, due to the exophytic, space-filling growth of the tumour, and also to the tendency of the tumour to ulceration and to development

of stenosis of the air passage, partly through the nose and partly through the Eustachian tube.

The *purely rhinological symptoms* are thus: uni- or bilaterally reduced or arrested nasal respiration, as well as nasal discharge and epistaxis.

The influence of the tumour on the Eustachian tube is sometimes due to mechanical compression and sometimes to penetration of the tumour into the tube. The result is in both cases *tubal occlusion,* which may be intermittent at first, but will soon become permanent, and manifests itself by tinnitus, clicking sensation, and impairment of hearing. The tubal occlusion involves a vacuum in the middle ear with pains in the ear and consecutive exudation, which at secondary infection gives a picture resembling that of otitis media.

Unfortunately the nasal and otogenous complaints are *often misjudged,* so that the patients are submitted to *different operations of the skeletal and soft tissues* in the nose, tubal catheterisations, paracenteses, etc. The frequent mistaken diagnoses are probably due to the fact that the primary tumour is often diminutive and consequently difficult to recognise for untrained examiners.

The fourth and last main group of signs and symptoms is that of *enlarged cervical glands,* which are due to the pronounced tendency of the tumour to early development of lymphogenous metastases, which can reach rather considerable degrees even bilaterally, even when the primary tumours are diminutive.

The typical glandular metastases develop posterior to the angle of the jaw, over the mastoid process beneath the sterno-mastoid, whence they later extend distally. This accords well with the

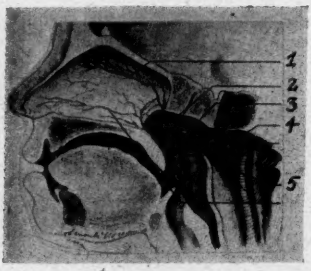

FIG. 12.

Sagittal section of the head seen from within (after *Rouviere*) with the lymph stems from the nasal septum (1) the lateral wall of the nasopharynx (2) and the tubal ostium (3) to the lateral retropharyngeal lymph node (4) and the superior deep cervical lymph nodes (5).

course of the lymph from the nasopharynx, which passes by the retropharyngeal lymph glands—or direct—to the superior group of the deep cervical lymph glands (Fig. 12). Clinically there occurs (Figs. 13, 14, 15) a steadily increasing, indolent node, whose consistency and fixation to the surrounding tissue depend on the type of the primary tumour, but is generally, however, rather firm and fixed deeply.

FIG. 13.

Male, aged 70 years (case 376) with right cervical gland metastasis in the place of election (developed through nine months) from as quamous cell carcinoma in the nasopharynx.

FIG. 14.

Female, aged 50 years (case 1) with bilateral paralysis of the sixth cranial nerve and right paralysis of the third nerve. Large bilateral cervical glands (of one year's duration) from squamous cell carcinoma on right nasopharyngeal wall.

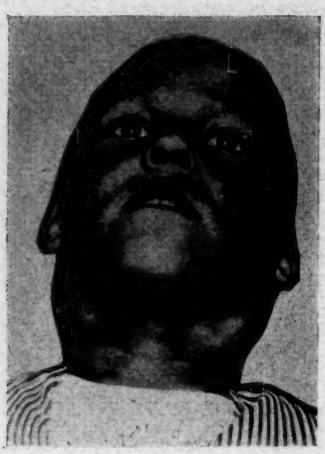

FIG. 15.

Boy, aged 10 years (case 205) with large bilateral cervical gland metastases (of 12 month's duration, regarded as tuberculosis lymphomas. Treated in seaside health resort, etc.), from a large lymphocytosarcoma in the nasopharynx.

The *cervical glands* being frequently the only sign of a nasopharyngeal tumour through half or whole years they are often mistakenly diagnosed as lymphomas of tuberculous or other infectious origin and treated by light baths, incisions, light X-rays, etc.

The *total number of mistaken treatments* for all the groups of symptoms amounts to *at least one-third of all the patients.*

Syptomatology of malignant nasopharyngeal tumours elucidated from own examination of 454 patients

After this more general review of the symptomatology I shall now pass on to a more statistically based account of the different symptoms.

As it is urgently necessary, in cases of malignant nasopharyngeal tumours, to have the diagnoses made both earlier and with greater certainty than is now the case, it is of importance to concentrate particularly on an elucidation of the early symptoms of these tumour forms. To give as clear a picture as possible of the often very polymorphous course of the tumours I have chosen to make an *analysis of the symptomatology at three different stages of the disease.*

The *first analysis* covers the first symptom(s) observed by the

patient. It occurs on an average 11 months (3 or 4 years at most) before the exact diagnosis is made.

The *second analysis* covers the initial symptomatological picture in a wider sense. At this stage there are found several symptoms within one group, or different groups are represented. This pathological picture is seen on an average 4 or 5 months before the exact diagnosis is made.

The *third analysis* covers the fully developed picture, which corresponds to the point of time at which the diagnosis is made and the patient referred to a radiological clinic.

The percentage frequency of ophthalmo-neurological symptoms at these three stages appears from *Table 1*, into which also the frequencies of the three other main groups of symptoms have been entered. The stated percentage figures refer—with inconsiderable limitations—to the 454 cases from my M.D. thesis.

Table 1 shows that ophthalmo-neurological complaints are the first symptom in 16·0 per cent. of the cases, while metastatic cervical glands and rhinological symptoms are both present as the first symptom in about one-third of the patients. Otological

TABLE I.

Percentage distribution of the different groups of signs and symptoms at three stages of the disease among 454 cases of malignant nasopharyngeal tumour.

	1st symptom 11 months before diagnosis is made	Initial picture 4 or 5 months before diagnosis is made	Fully developed picture when the diagnosis is made
Ophthalmo-neurological symptoms	16·0	34·8	38·0
Rhinological symptoms	30·8	51·4	56·2
Otological symptoms	23·3	48·5	49·1
Metastatic cervical glands	32·6	48·4	74·9

symptoms are rarer, being present in about one-fifth of the cases only. *Nearly all the symptoms are monosymptomatic* at this stage of the disease (in nine-tenths of the cases); and it must be emphasised that two-thirds of the patients did not complain of nasal symptoms, and that metastatic cervical glands were present already by this time in 32·0 per cent. of the cases.

At the next stage of the analysis, that is 4 or 5 months before the exact diagnosis is made, the most conspicuous changes are

as follows : The *ophthalmo-neurological symptoms have more than doubled in frequency* occurring now in 34·5 per cent., whereas the other groups of symptoms present more moderate increases in frequency, each being found in half of the patients. The frequency of monosymptomatic cases has become reduced to comprising one-fourth of the cases only against nine-tenths at the first stage.

At the *third and final stage of the analysis*—by the time the diagnosis is made—there are two facts which are particularly noteworthy : First the *frequency of ophthalmo-neurological symptoms is rather stationary,* being found in a total of two-fifths of the cases (or 38·0 per cent.), and secondly there is a *considerable increase in the frequency of metastatic cervical glands,* which are now present in three-fourths of the patients. Rhinological and otological symptoms, on the other hand, are rather stationary in frequency, occurring in about half of the cases.

These analyses show plainly that when *ophthalmo-neurological symptoms do occur* in cases of malignant nasopharyngeal tumour they manifest themselves *at early stages.* The ophthalmo-neurological cases can be said to have been separated out as a special group already on an average 4 or 5 months before the exact diagnosis is made. In other words, these symptoms do not —as previously believed—occur only at the advanced and hopeless stages of the disease, a fact which must stimulate our interest in a more energetic tracing of these cases.

The fact that the group of metastases in the cervical glands increases so considerably in frequency from the initial to the fully developed symptomatic picture is a serious reminder of the biological activity and tendency to spreading of these tumour forms. This again means that *if these cases can be diagnosed but a few months earlier than is now the case,* then one of the consequences will be that *the patients will be submitted to irradiation before the metastases have spread too far.* The chance of obtaining a favourable result from treatment with X-rays will then be increased very considerably.

Thus there appear to be various reasons for stimulating the interest in and knowledge of the initial symptomatology of the malignant nasopharyngeal tumours, in particular the ophthalmo-neurological symptoms.

Nature and frequency of ophthalmo-neurological symptoms

After this statement of the place in the symptomatology of the ophthalmo-neurological symptoms at the different stages of the disease, I shall now pass on to a more detailed description of these symptoms.

Be it stated at once that *all forms of cranial nerve lesions are met with,* as might have been expected from the manner of growth of

the tumour, but that there is found a certain systematisation. Thus for instance *lesions of eye nerves and/or trigeminus are found in practically all cases.* Before entering on a more detailed account I shall just mention an important proportional change in frequency between eye nerve lesions and trigeminus lesions at the three stages of the disease, where analyses have been made.

TABLE II.

Increase in frequency (per cent.) of ophthalmological symptoms compared with that of trigeminus lesions—from the first symptom to the fully developed picture.

	1st symptom 11 months before diagnosis is made	Initial picture 4 or 5 months before diagnosis is made	Fully developed picture when the diagnosis is made
Frequency of ophthalmological sympt. (per cent.)	14·4	51·0	75·2
Frequency of trigeminus lesions (per cent.)	71·0	70·0	68·0

It appears plainly from *Table II* that the purely ophthalmological complaints constitute a small percentage of the first symptoms, while the trigeminus lesions are in great majority. But at the second stage of the analysis (4 or 5 months before the diagnosis is made) the ophthalmological symptoms have increased very considerably in number, being now found in half of all the cases, whereas the percentage of trigeminus lesions has hardly changed. The increase in the frequency of ophthalmological symptoms continues—though less abruptly so—up to the point of time at which the diagnosis is made, comprising by that time 75·2 per cent. of the cases. They are then more frequent than the trigeminus lesions, which remain at a stationary frequency level (about 70 per cent.).

It is evident from this observation not only that *ophthalmological symptoms* are *present to a considerable extent in cases of malignant nasopharyngeal tumour,* but also that *these symptoms increase in frequency chiefly within the period in which the exact diagnosis has not yet been made,* and in which it should thus be *possible to have these cases correctly diagnosed by ophthalmological intervention.*

I shall now pass on to an account of the nature of the ophthalmo-neurological symptoms. The very *first symptom*—occurring about 10 or 11 months before the diagnosis is made—is in the majority of the cases (71·0 per cent.) trigeminal neuralgia, most often in the

maxillary area, and more frequently isolated than together with either nasal stenosis, metastatic cervical glands or tubal occlusion. The only ophthalmological symptom at this stage is abducens paresis, likewise more often monosymptomatic than combined with other symptoms. Half of the ophthalmo-neurological cases of my material were purely monosymptomatic, while in the other half the combination forms were rather equally distributed over metastatic cervical glands, nasal stenosis, and tubal occlusion (about 15 per cent. each).

By the time of the second analysis—4 or 5 months before the diagnosis is made—there has occurred not only a quantitative, but also a qualitative increase in the purely ophthalmological symptoms. A detailed description of the distribution will be given in connection with the findings at the fully developed stage of the disease, because there are found no essential qualitative differences between the ophthalmological symptoms of these two stages. I shall only just mention that the purely monosymptomatic ophthalmo-neurological cases are few (3 per cent.) at this stage, since forms combined with rhinological or otological symptoms and metastatic cervical glands respectively are found in 40 per cent. each of the cases.

Accordingly a patient who at this stage of the disease applies to an ophthalmologist on account of eye muscle paresis, visual disturbances, or exophthalmos, with or without attending trigeminal neuralgia, will present symptoms also from the other main groups mentioned here. When the *ophthalmologist is consulted by patients suffering from abducens paresis, impairment of vision, exophthalmos, or Horner's syndrome he should always suspect a malignant nasopharyngeal tumour to be the cause.* He can then strengthen or weaken his suspicion partly through palpation for metastatic cervical glands in the typical area, and partly by questioning as to the presence of rhinological or otological symptoms, possibly supplemented by an oto-rhinological special examination. The ophthalmologist can thus, through these simple examinations, *contribute decisively to the making of an exact diagnosis some therapeutically valuable months earlier than is generally the case.*

Of the 454 patients who displayed the fully developed pathological picture 172, or 38 per cent., presented ophthalmo-neurological symptoms.

The nature of the symptomatology appears from Table III, which shows that 75·2 per cent. of the cases had ophthalmological symptoms, and that two-thirds of these patients presented trigeminus lesion as well. Correspondingly two-thirds of the 68 per cent. with trigeminus lesion presented ophthalmological symptoms as well. Four patients only had neither ophthalmological

symptoms nor trigeminus lesion. It appears from this close connection between ophthalmological symptoms and trigeminus lesion that the tumour tissue injures preferably the area round the cavernous sinus, where—as already mentioned—these cranial nerves run in intimate relation to each other.

TABLE III.

Nature and frequency of ophthalmo-neurological symptoms in 172 patients with malignant nasopharyngeal tumours.

Eye symptoms 129 patients 75·2 per cent.	*Alone* 40 ptt. 23·4 per cent.	Ophthalmoplegia ... ... 22 patients Ophthalmoplegia + II ... 11 patients Ophthalmoplegia + Horner 3 patients II-lesion alone... ... ... 2 patients Exophthalmos... ... ... 2 patients
	With V-lesion 44 patients 25·6 per cent.	
	With other cranial nerve-lesion, partly V. 45 patients 26·2 per cent.	
V-lesions 117 *patients 68·0 per* cent.	With eye symptoms 78 patients 45·4 per cent.	
	Without eye symptoms 39 patients 22·6 per cent.	

The cases with ophthalmological symptoms can be divided in three almost equally large groups, namely (1) purely ophthal*mological cases, (2) forms combined with trigeminus lesions alone,* and (3) forms combined with trigeminus lesions as well as other *cranial nerve lesions, most often lesions of the ninth and tenth* nerves.

The frequency and nature of the individual ophthalmological symptoms proved to be fairly alike for each of these three groups. *The symptoms were of the following nature,* mentioned in decreasing order of frequency: Abducens paresis, paresis of the third *nerve, visual pathway lesion, paresis* of the fourth nerve, Horner's syndrome, and exophthalmos.

All the nerve lesions mentioned here can occur as isolated phenomena; but most often they are found in different forms of *combination,* for instance, as regards the ophthalmological symptoms, in varying forms of ophthalmoplegia with or without attend*ing visual pathway lesion,* Horner's syndrome, or exophthalmos.

A direct impression of the frequency of the different cranial nerve lesions is obtained from Table IV, into which have been entered the 461 single nerve lesions presented by the 172 patients.

TABLE IV.

Nature and frequency of 461 single nerve lesions in 172 patients with malignant nasopharyngeal tumours.

Nerve lesions		VI	III	IV	II	Horner	V	Others
Frequency	Abs.	114	42	29	29	27	119	101
	per cent.	24·0	9·1	6·3	6·3	5·8	25·7	21·8

It appears from this table that eye nerve lesions constitute more than half of the total number of cranial nerve lesions, partly in the form of ophthalmoplegias (39·4 per cent.), partly as visual pathway lesions (6·3 per cent.), and Horner's syndrome (5·8 per cent.). Among the ophthalmoplegias the predominating group is that of paresis of the sixth cranial nerve, which constitutes one-fourth of the total number of nerve lesions, being thus almost equal in frequency to trigeminus lesions, which comprise 25·7 per cent.

Pareses of the third and fourth cranial nerves are of much rarer occurrence. The same is the case with pareses of the other cranial nerves (VII, and IX-XII), which altogether constitute 21·8 per cent. distributed over 7 cranial nerves, chiefly the bulbar nerves.

Of the 461 cranial nerve lesions 6·7 per cent. were *bilateral lesions*, which in practically all cases affected the eye nerves. Thus one-third of the optic tract lesions and one-tenth of the ophthalmoplegias were bilateral.

Thus it is plain to see that *the ophthalmological symptoms play a predominant part in the symptomatology*.

The *ophthalmoplegias* generally manifested themselves as massive paralyses with associated clinical findings. The *visual pathway lesions*, on the other hand, presented various degrees of severity from a slight impairment of vision to the more frequent total amaurosis with atrophy of the optic nerve or choked disc. Quadrantanopsia or hemianopsia were of rarer occurrence.

Exophthalmos due to penetration of the tumour into the orbit was found in 19 patients with varying degrees of chemosis and disturbances of motility, usually associated with a poor general state.

I shall not go into details with regard to the trigeminus lesions, but only just mention that they consist most frequently in

neuralgias in one or more of the three branches, whereas the motor root is more rarely affected.

As mentioned before, we have to do with *multiple cranial nerve* syndromes in a great number of the cases; but it would be going too far to go into further details regarding the nature of these syndromes. Yet I want to mention, by way of example, one *cranial nerve syndrome with a special pathogenesis, which has not been described before,* and the occurrence of which must be regarded as *pathognomonic of malignant nasopharyngeal tumours.*

This syndrome *comprises ophthalmoplegia* (most often sixth nerve paresis) *and paresis of the twelfth cranial nerve* and in the majority of the cases also trigeminal neuralgia. It was observed in 9 cases, so there is reason to suppose that it was not an accidental combination. The pathogenesis of the ophthalmoplegia and the trigeminal neuralgia is the usual result of tumour invasion round the cavernous sinus. The explanation of the paresis of the twelfth cranial nerve, which was present without lesion of other distal cranial nerves (so that diffuse tumour growth can be left out of account) is obtained from the lymphatic conditions. Metastatic cervical glands were observed in all these cases, and the primary tumour was found to be lateralised more often than usually, so that the lymph ran to the retropharyngeal lymph glands, which lie off the hypoglossal canal, where it compressed the nerve.

This cranial nerve syndrome is thus conditioned partly by the intra-cranial growth of the primary tumour, and partly by lymphogenous metastases, and is therefore pathognomic of a malignant neoplasm in the nasopharynx.

Roentgenography

Before passing on to the final conclusion I shall briefly state some facts regarding the roentgenography and the treatment in cases of malignant nasopharyngeal tumour.

Roentgenography may, through an ordinary lateral picture of the skull, accidentally disclose a tumour in the nasopharynx, since such a tumour will cause a characteristic deformation of the contour of the wall. More important is, however, the knowledge one gets through a basial picture for an estimate of the extent of a possible osseous destruction. Osseous destruction in the base of the skull with typical localisation in the foramen lacerum area was found in 54·3 per cent. of the ophthalmo-neurological cases. There is an intimate correlation between the roentgenological and the ophthalmo-neurological findings. It may seem an extraordinary thing that nearly half of the ophthalmo-neurological cases presented no osseous destructions, but this is due partly to the fact that the nerve lesions were exocranial, and partly to the fact that the primary tumour can invade the base of the skull through the already existing foramina.

Treatment

The treatment of malignant nasopharyngeal tumours is now purely radiological, as there is contraindication for operative treatment (both from a technical and from a biological point of view) of such deep-seated and invading tumour forms. Fortunately such tumours are generally rather radiosensitive on account of their biologically immature character.

A *strong, external, protracted, fractional X-ray or teleradium treatment* is given, which on rare occasions is supplemented by a local radium or X-ray treatment. The X-ray treatment is given in anterior and lateral fields (Fig. 16) in doses of from 4,000 to 10,000 r.

FIG. 16.

A female, aged 41 years, with characteristic pigmentation of skin portals (lateral and anterior) by the end of an X-ray treatment (9000 r skin doses). Clinically there was found a malignant nasopharyngeal tumour with extensive destruction in the base of the skull, paralysis of the sixth nerve, and *Horner's* syndrome; no metastatic cervical glands. Symptom-free through three years of observation (case 103).

through from 3 to 8 weeks. This treatment can *secure a lasting freedom from symptoms* (over 5 years), but whether it does so depends to a certain extent on the histopathological type of the primary tumour and on the extent of the disease. The radiosensitive reticulum-cell sarcomas, for instance, show a " five year cure rate " of nearly 40 per cent., while the corresponding figure for the total number of cases amounts to 22·2 per cent.

The *prognosis* is reduced for higher degrees of intracranial invasion; but it should be emphasised that even in cases of cranial nerve paresis and osseous destruction of the base, where all other treatment is in vain, it is possible to secure a lasting freedom from symptoms (over 5 years) by irradiation.

Four-fifths of the patients experience a primary improvement after irradiation; but the lasting results are confounded by a pronounced tendency to recurrence and generalisation, so accordingly the lethality is very high.

Summary and conclusions

Finally I shall sum up what I have said about nasopharyngeal tumours.

The malignant nasopharyngeal tumours are fairly rare tumour forms, but not so rare as they were previously supposed to be. They occur in all age-classes, and are more frequent among men than among women.

The symptomatology, which is very polymorphous and, therefore, to a great extent gives occasion to mistaken diagnoses and wrong treatment can be divided schematically in four groups: (1) Ophthalmo-neurological symptoms due to penetration of the tumour into the base of the skull and the parapharyngeal space, (2) local rhinological, (3) otological symptoms due to the exophytic growth of the primary tumour, and finally (4) metastatic cervical glands, which are typically localised and early developed.

A fractional analysis of the symptomatology at different stages of the disease showed that the ophthalmo-neurological symptoms occur both earlier and to a greater extent than is generally known, and that the ophthalmological symptoms predominate, chiefly as ophthalmoplegias with or without attending trigeminal neuralgias.

Patients suffering from unrecognised, malignant, nasopharyngeal tumours will therefore often apply first to an ophthalmologist on account of ophthalmoplegia or impairment of vision. The ophthalmologist can then do good service in making the exact diagnosis. To do so he must be on his guard with all ophthalmoplegias and visual impairments, etc., of unknown aetiology. The suspicion of a malignant nasopharyngeal tumour is strengthened or weakened partly through palpation for metastatic cervical glands in the typical area posterior to the angle of the mandible, and partly through oto-rhinological special examinations.

If these lines are followed a great number of otherwise mistakenly diagnosed cases will become recognised several important months earlier than is generally the case, and the adequate irradiation treatment will then be instituted at an earlier and, for the results of treatment, more favourable point of time.

The effect of modern intensified irradiation, which is often surprising in the cases of these immature tumour forms, makes the proper background for a more extensive ophthalmo-neurological diagnostication along the lines indicated here, which, when followed, will benefit the patients and reflect great credit on the doctors.

REFERENCES

GODTFREDSEN, ERIK.—Ophthalmological and neurological symptoms in malignant nasopharyngeal tumours. A clinical study comprising 454 cases. With special reference to histopathology and the possibility of earlier recognition. *Acta Ophthal.*, Suppl. XXII, 1944; *Acta Psych. and Neurol.*, Suppl. XXXIV, 1944; *Acta Oto-Laryngol.*, Suppl. LIX, 1944; *Acta Path and Microbiol. Sc.*, Suppl. LV, 1944; *Diss.*, p. 320, 53 Fig., Munksgaard, Copenhagen, 1944.

SOME RESEARCHES ON THE RESPIRATION OF THE CORNEA IN ALBINO RATS*†

BY

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GRONINGEN

Introduction

IN studying literature dealing with the respiration of the cornea, we get the impression that our knowledge concerning this subject is rather defective. At any rate, we may say that the question whether the cornea uses the oxygen of the surrounding air is still far from settled.

Duke-Elder[1] assumes that the cornea possesses a respiratory mechanism, whereby gases are actively transpired through the agency of the epithelium and the endothelium.

Bullot[2], arguing on the grounds that in his experiments the endothelium of rabbits' eyes dies when the surrounding air is replaced by a mixture of 1 part air and 14 parts hydrogen, is of the opinion that the endothelium needs the oxygen from the surrounding air. This investigator placed the entire enucleated eyeball of the rabbit, with its epithelium scraped off, in an atmosphere of moist air at 35°C. and observed that, after 15 hours, the endothelium was still living over the entire surface. When, however, the surrounding air was sufficiently rarefied with hydrogen (*e.g.*, 1/15) it was established that after the same length of time all the endothelium cells were dead.

* From the Histological Institute, University Groningen, Director: Professor J. de Haan, M.D. † Received for publication, December 7, 1946.

These facts certainly suggested the possibility that the endothelium uses the oxygen from the atmosphere, but as the experimental circumstances were far from physiological (the eyeballs being enucleated and the epithelium scraped off), these investigations do not determine whether also in the living animal the oxygen passes through the cornea from the air towards the anterior chamber.

Fischer[3] has carried out some experiments with the object of examining the respiration of the cornea. All his experiments were performed on rabbits. He constructed a small glass-bell, which was placed upon the luxated eyes of the animals. Thus by means of small tubes furnished with stopcocks, he could fill up the gas-chamber of the apparatus with a definite gas, *e.g.*, carbon dioxide or hydrogen with oxygen. At certain intervals gas-samples were taken out, in order to determine the consumption of oxygen or the production of carbon dioxide. His collective results were shown in a table. He compared among other things, for example, the respiration of a normal cornea with that of a cornea deprived of its layers of epithelium and endothelium. As to the CO_2-production and the O_2-consumption practically no difference could be noticed after one hour between the normal and the abnormal cornea; whereas after *four* hours the CO_2-production was the same for both corneae, the O_2-consumption, however, of the normal cornea was about 60 per cent. greater than the consumption of the abnormal cornea. So his results showed inexplicable irregularities. From these indeterminate results Fischer derives far-reaching conclusions. This investigator assumes that the cornea forms a barrier to the permeation of O_2 and CO_2 only in one direction, the oxygen being able to travel only backwards through the cornea from the air towards the anterior chamber, the carbon dioxide being able to pass the cornea only in the opposite direction. When Fischer filled up the glass-bell with 100 per cent. CO_2, he observed that this had a deleterious effect on the cornea within one to two hours. The corneae became totally opaque. Taking into account his view that the cornea is permeable for CO_2 only in one direction, it was obvious that he imputed the injurious influence of this gas to the impediment of the normal permeation of CO_2 through the cornea from behind towards the surrounding atmosphere. As this selective permeability of the cornea for CO_2 however, is by no means certain, Fischer's conclusion, based on this property also lacks reasonable ground.

I got the impression that in Fischer's experiment it was not the normal respiration of the cornea which was measured. In the first place, we notice that the glass-bell was compressed air-tight to the eyeball. In doing this, we cannot expect the normal circulation in the blood vessels of the eyeball to go on without any disturbance

and naturally a change in the respiration of the cornea will be caused by any impediment in that circulation. In the second place, we may ask whether Fischer succeeded in measuring only the respiration of the cornea. Was it possible to exclude any influence of the blood in the surrounding limbus-vessels? And thirdly we must remark that the investigations were carried out on luxated eyeballs. Here too we have a factor which interferes with a normal circulation.

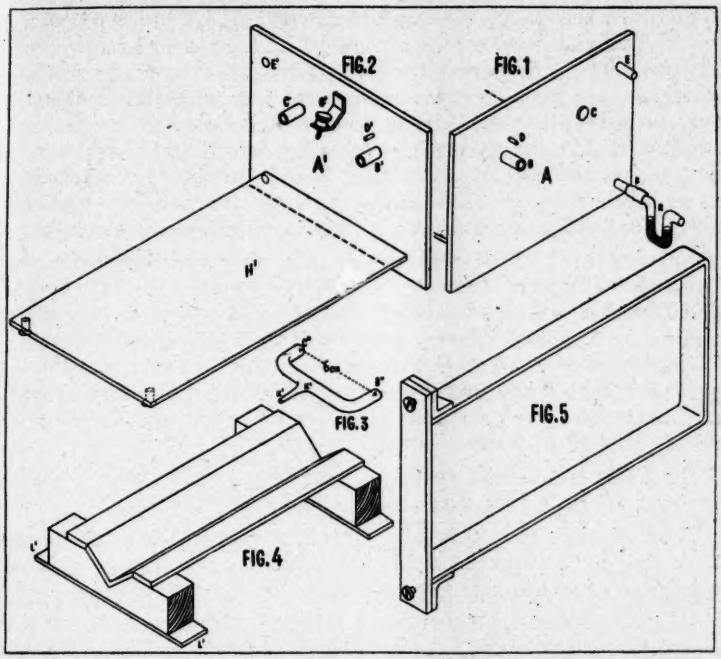
I have therefore thought it worth while to reinvestigate the question of the selective permeability of the cornea. A quite different line of research was started by my experiments.

The anaesthetised experimental animals (albino rats) were put into a closed space in an atmosphere of nitrogen or carbon dioxide or a mixture of these two gases. Of course artificial breathing was necessary to keep the animals alive. The object of these investigations was to examine if any injury of the cornea could be shown under the influence of these gases. We must draw attention to the fact that in my experiments the circulation of the eyes remained under absolutely physiological circumstances (the possible influence of the narcosis we may neglect). The arrangement of my experiments did not allow the measuring of the consumption of oxygen or the production of carbon dioxide, but it was pre-eminently suitable for studying the influence of different gases on normal eyes *in situ*. After an exposure of the eyes to the above mentioned gases for several hours, the animals were killed and the eyes were microscopically examined.

Before stating the results of the experiments we will first give a detailed description of the apparatus used.

A thick walled glass tank (accumulator tank), open at one side and measuring 11 by 14 by 24 cm., was made air-tight by a copper plate (frontplate A in Fig. 1 and A′ in Fig. 2) with the aid of a rubber packing. This front-plate was held in position by two u-shaped frames and two strips of copper (one of each is shown in Fig. 5) and thus a closed space was obtained, in which the animals remained throughout the experiments. It is desirable to use a tank made of glass in order to be able to watch the animal in the course of the experiment.

Near the lower edge of the frontplate and parallel to this a horizontal metal plate is soldered (H′ Fig. 2). At the back end of this plate are two small knobs on which it rests upon the bottom of the tank, when the frontplate is mounted. The object of this plate is to support a, let us say, small operation table (Fig. 4), on which the animals are tied. This operation table is attached by its metal strips (L′) to the horizontal plate with the help of four clips.



The frontplate is pierced by 5 copper tubes. The parts of these tubes inside the tank are indicated in the diagrams by an accented letter, the corresponding end outside the tank by the same letter non-accented. BB′ and CC′ have a bore of 6 mm. B′ and C′ are connected by rubber tubing to the trachea cannula. This consists of a right angled curved glass tube (B″ C″ Fig. 3) with a small side-tube K′K′ (the trachea cannula proper). B is connected with a small airpump during the course of the experiment. This pump provides a continual air current from B to C. After the animals have been anaesthetised by an injection of a $\frac{1}{2}$ per cent. solution of amytal sodium and after they have been tied on the operation table, the skin in front of the neck is cut through in the median line and, the muscles having been pulled aside, the trachea is brought into view, covered by the deep cervical fascia. The trachea is opened and the trachea cannula is inserted into it. B″ is connected with B′ and C″ with C′. Care must be taken not to injure the mucosa or the blood vessels, as the smallest amount of liquid would clog the cannula, causing death by suffocation. If the operation is carefully performed the animals can be kept alive for many hours. By means of the adjusting screw G′, resting

upon the glass tube, the trachea cannula K'K' can be inclined in any definite way, so that traction of the trachea is avoided. The volume of air between B" and C" is used as a source from which the animal inhales its oxygen and into which it exhales. It may be asked if it would not be simpler to connect the trachea cannula K'K' by means of a lengthening-tube direct with the open air, without using an airpump. This, however, is impossible, as such a narrow cannula would be too long, whereby the resistance, offered to inspiration and to expiration would become too strong.

The small tube DD', with a bore of 1½ mm., is connected at its one end D' by valve tubing to an injection needle and at its other end D with a syringe. Before closing the tank, the syringe, tubing and needle are filled with the anaesthetising solution and the needle is inserted under the skin of the rat. In this way it is possible to give an injection now and then during the course of the experiment, and thus the experimental animals can be kept continually under narcosis for many hours.

By a few sutures the eyelids are prevented from closing. Thus the eyes are fully exposed to the gas under investigation.

A small piece of iron is held against the inner side of the upper tank wall by a magnet outside the tank. By moving the magnet this piece of iron inside the tank can also be moved. This is very

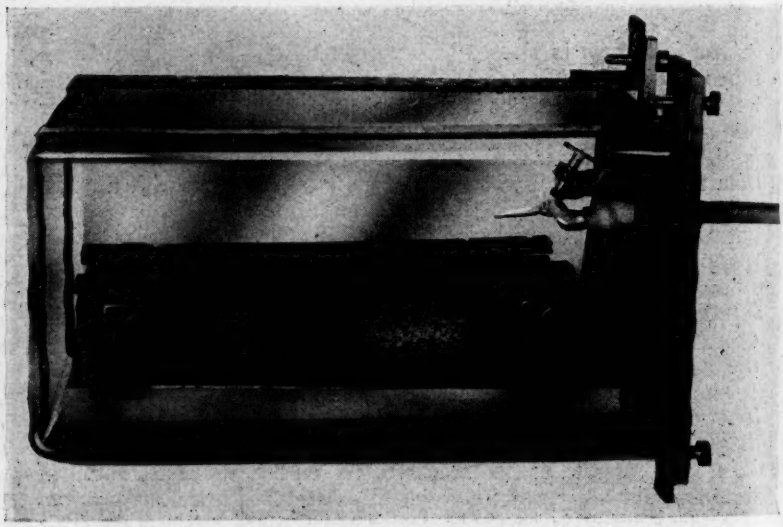


FIG. 6.

convenient, as it wipes away the condensed water vapour from the inner glass wall, thereby facilitating looking into the tank.

Now the frontplate is brought into its position and the horizontal plate with its operation table and experimental animal is pushed into the tank. The frontplate is closed air-tight by means of the two frames and the airpump is immediately put into action. A photo of the whole apparatus (Fig. 6) elucidates the relation of the different parts in their normal position.

As it is very difficult to drive the air out of a tank by a gas, *e.g.*, nitrogen, and as it is not easy to tell when the moment has arrived that the air is fully replaced by such a gas, I used another method, which allowed the filling of the tank within a short time with the desired gas or gas-mixture in a reliable way.

The copper tube F near the bottom of the tank in the frontplate is connected by rubber tubing to a u-shaped glass tube R. This is the inlet for a 1 per cent. NaCl-solution, previously saturated with the desired gas. The tank is completely filled up with the saline, while the air escapes through the open stopcock in tube E near the upper edge of the frontplate.

When the tank is nearly full of the salt solution, the breathing of the animal is interfered with, as water is little compressible. Therefore we must act very quickly. At the same moment that the tank is fully filled up with the solution, the gas under investigation is let in through tube E, while the salt solution can flow away through tube F. When the water has fallen so far that the level stands in the upper part of both the legs of the u-shaped tube R, the stopcock in E is closed. In this way we have achieved our object of filling up the tank quickly with a definite gas.

We may neglect the influence of the vapour-tension of the water, as diminishing the tension of the gas under investigation.

The operation on the experimental animals and all the further manipulations until the end of the experiment, were performed in a room at a temperature of 37°C.

Description of the results

The albino rats used had an average weight of 180 to 200 grs. They were anaesthetized by a subcutaneous injection of 4 c.c. of a 0·5 per cent. solution of amytal sodium in aqua dest. After about 20 minutes the narcosis generally was complete. Every two to three hours 1 or ½ c.c. of the solution was injected in order to keep the animals under narcosis. The next quantum of the narcotic was generally given when the animals showed some signs of reawakening, for instance when just perceivable contractions in the legs were visible. It is clear that this made it necessary to watch the animals constantly. A good indicator for judging if the respiration of the animal is going on normally is the pink colour of

the tail. The slightest disturbance in the respiration betrays itself by cyanosis of the tail.

The gas being saturated with water-vapour, the eyes will be protected from desiccation, though lacking the normal blinking of the eyelids.

In the first place my experiments had the object of investigating whether absence of oxygen in the atmosphere would cause any pathological changes in the cornea.

I obtained results similar to Fischer in so far that I could show that normal life of the cornea is possible in the absence of oxygen. After a stay of 12 hours in an atmosphere of pure nitrogen, the corneae remained quite clear and microscopically no injurious influence was found. In fact we could hardly have expected anything else. I only need to point to the fact that a whale can remain under water for some hours, that is in a medium with a very low concentration of oxygen, to understand that, besides the oxygen normally supplied by the blood vessels in the eye, the cornea does not need any other source of oxygen to preserve its integrity. If the normal respiration of the cornea depended on the oxygen content of the surrounding air the eyes would certainly get into a precarious position during sleep, when the eyes are hidden behind the closed eyelids. Altogether we may say that the evidence points to the fact that in normal circumstances the cornea does not use the oxygen from the surrounding atmosphere.

In order to investigate the influence of CO_2 on the cornea, in the first place some experiments were carried out on rats in an atmosphere of pure carbon dioxide. Within half an hour the corneae became totally opaque. Consequently the deleterious effect of CO_2 is obvious. The results of these experiments agree with those of Fischer. From such evidence alone, however, it could not be argued that it was an impediment in the normal permeation of CO_2 through the cornea from behind towards the air which caused this injurious effect. On the contrary, the probability was great that the high concentration of CO_2, being far from physiological, was the direct cause of the death of the corneal tissues.

It is clear that as Fischer's experiments were not carried out under physiological conditions, they did not prove the selective permeability of the normal cornea. Moreover, such a selective permeability in other animal membranes is still quite unsettled, *e.g.*, Wertheim's experiments showing the permeability of NaCl through the frog's skin only in one direction could not be reproduced.

Even my own experiments cannot give a definite answer to the question whether a selective permeability of the cornea exists or not. Yet they have made this assumption very improbable. The following experiments show that a stay of several hours in a CO_2

concentration, higher than any normal CO_2 concentration in the body (8 per cent.), does not cause any pathological changes in the cornea.

Assuming that carbon dioxide normally diffuses away through the cornea from the anterior chamber towards the surrounding atmosphere, and assuming with Kronfeld[4] that the CO_2-tension in the aqueous humour lies between the CO_2-tension of the venous blood and the arterial blood, we may be certain that a concentration of 8 per cent. of carbon dioxide outside the eye is high enough to impede the eventual permeation of CO_2 through the cornea.

This concentration, being not far above the normal CO_2-tension in the tissues, has the advantage of being almost physiological and it is not to be expected that it will have a direct noxious influence upon the cornea.

Some introductory experiments showed us that after two hours in an atmosphere of 8 per cent. of CO_2 and 92 per cent. of nitrogen the corneae remained fully transparent. When we compare this with the injurious effect of 100 per cent. of CO_2, causing the death of the corneal tissues within half an hour, we notice a striking difference. It goes without saying that the conception that the deleterious effect of CO_2 is caused by an impediment of the permeation of CO_2 through the cornea towards the exterior air, must now be rejected.

Repeated observations under the same circumstances as to the CO_2-concentration (8 per cent.), but after more prolonged times (10 hours and more) have shown that no pathological changes were caused in the cornea. Histological investigation showed us that the corneae were normal in every respect. In one section sometimes 16 karyokinetic figures were seen in the deep layer of the corneal epithelium. This means that in such a cornea a few thousands of cell divisions occurred simultaneously. We could hardly wish for a more convincing proof of the integrity of the cornea. At first I was of the opinion that this large number of cell divisions was abnormally high, and that it was the consequence of an irritating action of the CO_2-gas.[5] However, on counting the cell divisions in a cornea of normal rats of the same age, the number of mitoses found here, was not considerably lower than in the cornea of the experimental animal. Thus we may conclude that also in this respect the cornea of the experimental animals does not show any abnormality.

Since my experiments have shown that it is impossible to accept a noxious effect of one or other factor causing an impediment to the hypothetical normal diffusion of the carbon dioxide through the cornea towards the exterior air, we must give an explanation of the deleterious influence of *high* concentrations of this gas (*e.g.*, 100 per cent. of CO_2). I believe that we must assume a direct

noxious influence of the CO_2 causing rapidly the death of the whole cornea. In other words, I am of the opinion that carbon dioxide is able to permeate through the cornea from the surrounding atmosphere towards the anterior chamber, the possibility of which Fischer denies.

Summary

In this paper I have given a description of some experiments which had the object of studying the influence of various concentrations of CO_2 and the absence of oxygen in the surrounding atmosphere on the cornea of anaesthetised albino rats. With the help of artificial breathing it was possible to close up the animals in a tank filled up with one kind of gas or another, and in this way to expose the eyes of the experimental animals under otherwise normal conditions to the gas under investigation. It could be determined that the so-called selective permeation of carbon dioxide through the cornea is not probable. Absence of oxygen in the surrounding atmosphere does not inhibit normal life of the cornea. The corneae remained transparent for many hours in an atmosphere of 8 per cent. of carbon dioxide and 92 per cent. of nitrogen. Special attention was paid to possible pathological changes in the corneae after the experiments were finished.

REFERENCES

1. DUKE-ELDER.—Text-book of Ophthalmology.
2. BULLOT, G.—*Jl. of Physiol.*, Vol. XXXI, p. 359, 1904.
3. FISCHER, F. P.—*Arch. f. Augenheilk.*, Vol. CII, p. 146, 1930.
4. KRONFELD.—*Arch. f. Ophthal.*, Vol. CXVIII, p. 606, 1927.
5. BAKKER, A.—*Ned. Tydschr. Geneesk.*, Vol. LXXXV, p. 1121, 1941.

CONTRIBUTIONS TO TOTAL BLEPHAROPLASTY*†

BY

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THE substitutions of deficiency of the whole lid is one of the great problems in plastic ophthalmic surgery and more so, if the upper lid is absent. There have been several methods published, recommended and employed. Here I want to show three different methods of restoration—better to say substitute—for upper lid loss, providing suitable outer and inner layer at the same time.

CASE 1 (Fig. 1). The left upper lid of a lady aged 60 years was

* Received for publication, November 15, 1946.

† Report from the University Eye Clinic, Debrecen. Leader: Professor Kettesy.

infiltrated with carcinomatous tissue. The tumour was the size of a green almond with ulcerated surface and of very interesting origin. Several months before the plastic operation was done she had been twice operated on for multiple chalazia. The tumour developed possibly out of chronic inflammation of the Meibomian glands. This was shown by microscopic sections. The pathologist's diagnosis was carcinoma alveolare.

After the extirpation of the tumour the whole upper lid was lost, only a one and half cm. broad skin strip was left beneath the

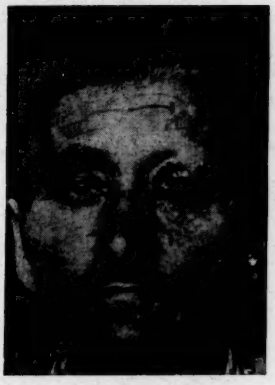


FIG. 1.

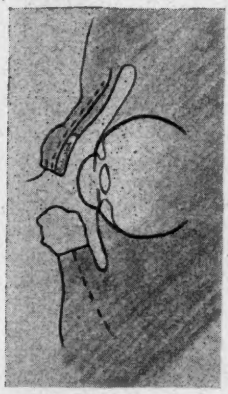


FIG 2.

eyebrow. The bulbar conjunctiva was intact with 3 mm. of upper fornix. Here we decided to employ Hughes's method, but reversed. He rebuilds the lower lid out of the posterior layer of the upper lid, and of the skin and even of the peri-orbital parts of the face. The procedure is based on Landolt's and Kuhnt's ideas, who actually establish a total blepharorhaphy between the lid-stump and the split normal lid. The two layers are separately united and in a different level. (Figs. 2, 2*a*, 2*b*).

Fig. 3 shows the state after the blepharorhaphy.

Nine months later a new palpebral fissure was opened at the the desired height (Fig. 4). We hope to get in another few months a fairly good function also.

CASE 2. An old lady aged 71 years lost the left upper lid, a basal-celled carcinoma infiltrated one third of the width and the entire length of the lid. The surface was badly ulcerated.

In this case we chose Blaskovic's II method. The tumourous eyelid was excised through healthy tissue. After that we mobilised the remaining conjunctiva of the eyeball and putting 3-4

FIG. 2*a*.

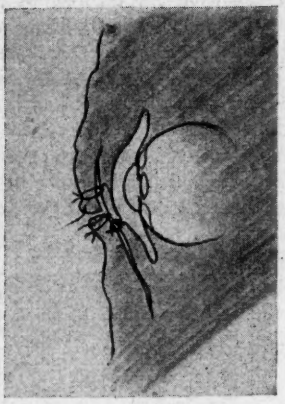


FIG. 2*b*.

simple sutures in its border, sew it to the skin of the lower lid, at the level of the orbital margin (Fig. 5). Then, with a bridge-flap of 1·0 – 1·5 cm. breadth, outlined parallel with the eyebrow, the

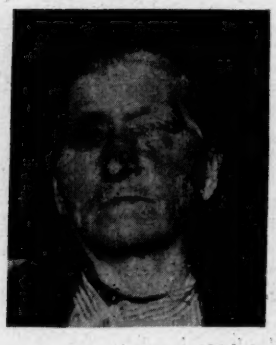


FIG. 3.

FIG 4.

anterior layer of the future lid margin was performed (Fig. 6). The secondary large defect was covered with a Kettesy graft. Figs. 7 and 8 show the result after the operation.

CASE 3 is of particular interest. I have shown it already at the Oxford Ophthalmic Congress in the year 1938, then speaking generally of the arched plasty. It occurs very seldom, one has to restore both lids, and to be able at the same time to save the eye

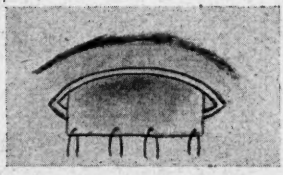


FIG. 5.

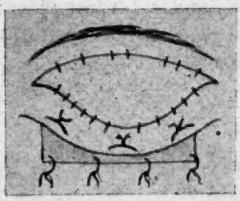


FIG. 6.

too. That happened in our case, a woman aged 57 years (Fig. 9) had an enormous carcinoma partly cicatrised in consequence of other treatment applied elsewhere, partly progressive of the baso-cellular type. The eyeball was intact with sight :1, so we decided to save the bulb. We removed of the total upper and lower lid, inner and outer canthus and a piece of the forehead skin. Then we had the problem how to substitute both eyelids with both

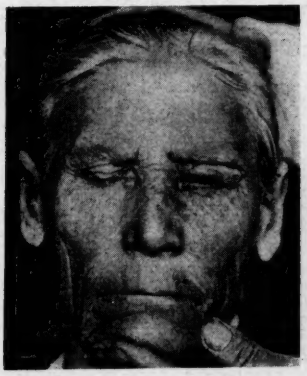


FIG. 7.

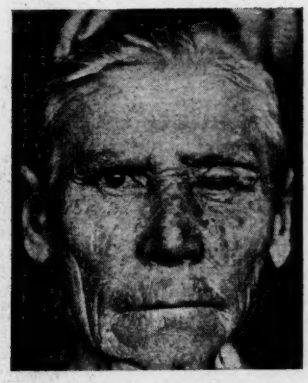


FIG. 8.

layers. Fortunately some bulbar conjunctiva was left, and we thought the posterior layer could be done by that. We covered the huge defect with a single sliding flap after Blaskovics, known also as Hungarian plastic (Fig. 10). This extended from the inner canthus to the auricular lobe. The flap was perfectly living, but we were not sure whether the conjunctival sac would develop that we wanted so badly. Eight months later our patient returned, and then one could feel the moving eyeball, and above this a cystoid growth which had developed underneath the flap. Naturally this was a good sign because the walnut sized tumour was a cyst in that

the conjunctival remnants met above the cornea. So we could hope to find, by preparing with a horizontal cut an eyelid fissure, the cornea unaltered. Moreover we were intending to form the eyelids having there already some conjunctival tissue.

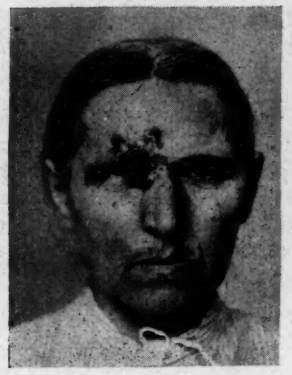


FIG. 9.

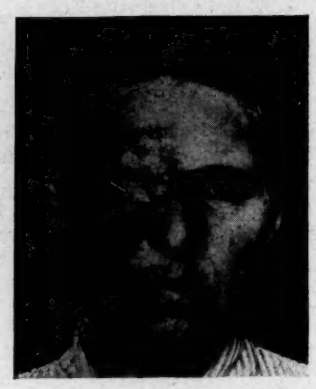


FIG. 10.

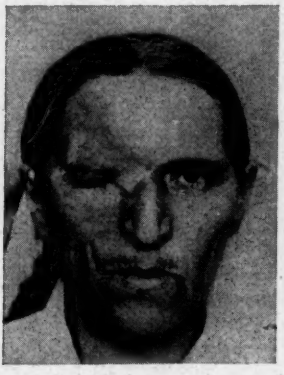


FIG. 11.

When the eyelid fissure was actually done we found the eyeball intact, sight unaltered. Later on from the viewpoint of cosmetics we made an attempt at tattooing an eyebrow (Fig. 11). We intended also to make some kind of ptosis operation, but we lost our patient by the war.

Summary

These cases above represent three different methods of substituting the total lack of eyelids. Applying these methods we never failed. The first procedure is Hughes's method, that is equally fit to restore the upper and lower lid. Blaskovic's II operation is suitable when the whole upper lid is missing. The Hungarian plastic generally is used only for substituting the lower lid but in cases when both lids are lacking we recommend the sliding flap, moreover if we hope to save the bulb, being able to replace at once the upper and lower lid with one arched plasty.

REFERENCES

BLASKOVICS and KREIKER.—Eingriffe am Auge. Enke. Stuttgart. 1938.

ANNOTATIONS

On Forewords

IT is becoming increasingly common nowadays to find new medical textbooks issued from the press with a foreword which, in most instances, has been contributed by some physician or surgeon of outstanding personality. It is one of the penalties attaching to the exalted position they have reached in their profession.

Johnson's Dictionary makes no mention of the word, but the Shorter Oxford Dictionary dates it from the year 1842 and defines it as "a word said before something else, hence a preface." But it is not the recognised preface in professional books, for this is always written by the author. The word is not a particularly pleasing one, and we might say, as Mrs. Blimber said of the name of Mr. Glubb, the old man who drew the bath chair in which little Paul Dombey was dragged on the sands of Brighton, that it is unclassical to a degree. If a really classical substitute is desired we can think of no better word than prolegomenon. Prelude, proem and introduction are quite unsuitable and we do not much care for preamble or prologue in this connexion.

Altogether we fear that the foreword must stand, for we do not see what better word could be chosen. When we began this note we toyed with the phrase "Grace before Meat"; but have decided that it is hardly suitable and the shade of Charles Lamb might be offended; and the proposition might be maintained that in this case the grace should be placed after the meat and not before it. We refrain from drawing a parallel between the foreword and placenta praevia or between an epilogue and the after birth.

The Surgical Team

IN the modern operating theatre perfection can only be obtained by a good team, every member of which from the 'chief' to the theatre attendant must know when and how to play his part accurately, carefully and with perfect timing in order that the patient may have an operation performed efficiently and expeditely. Disharmony is inevitable when despite a 'chief' whose operating ability is of a high order his assistant is clumsy or unable to anticipate the next move ahead, or the nurse in charge of instruments delays in passing these, or the theatre orderlies are noisy and heavy-handed in the transfer of the patient to and from the table. The team drill of an eye operation should be so well understood by all those taking part that the surgeon should have no cause to speak except for a preliminary word of encouragement to a patient under a local anaesthetic and a few directions to him if need be.

In the large teaching hospitals in London and certain provincial towns where the smooth running of a surgical team should be exemplary to all those who visit such centres of instruction, this ideal is rarely maintained for long. Every six months a trained assistant leaves and his place is taken by another inexperienced in the ways of his surgical chief. The more frequent changes in nursing staff upset the team work even more than the change of assistant. It seems that most matrons consider it necessary for all nurses to 'go through' the theatres and many who may be good and efficient in the wards have no aptitude for theatre work, and indeed some are a menace to the safe conduct of an operation and to the proper care of instruments. This circulation of untrained medical and nursing assistants is considered necessary for teaching purposes.

In the Army field hospitals during a busy intake of casualties it sometimes happened that a key member of a trained team would be taken away. It was in vain that one argued with matrons that whilst such changes may have had an educative justification in peace time that under active service conditions such a move was uneconomical in time and efficiency. The parallel illustration of taking a gunner out of a tank crew and replacing him with a pioneer was not appreciated.

Is it always necessary to train the embryo eye surgeon to be a good assistant before he is capable of operating and is it desirable for all nurses to receive a smattering of theatre training for a time quite inadequate to do any good ?

What is the ideal ? In a large teaching hospital we think that a surgical team should be carefully selected, drilled and kept together. It is desirable also to train reserves who can fill a vacancy in the event of illness, holidays and other eventualities. These reserves could be composed of the resident in training to take over the duties

of his predecessor and similarly a nurse understudying the 'charge nurse.' Only with such a team is it possible to demonstrate the smooth sequence of operative steps efficiently and expeditely.

THE OPHTHALMOLOGICAL SOCIETY OF AUSTRALIA

(British Medical Association)*

Annual Meeting

THE sixth annual general and scientific meeting of the Ophthalmological Society of Australia (British Medical Association) was held at the Royal Australasian College of Surgeons, Spring Street, Melbourne, on October 23, 1946. The President, Dr. J. Ringland Anderson, occupied the chair. Those present included three members from Queensland, ten from New South Wales, thirty-one from Victoria, two from South Australia and two from Western Australia.

President's Address

The President, Dr. J. Ringland Anderson extended a welcome to such guests as had been able to attend, but particularly to Air-Commodore P. C. Livingston, C.B.E., A.F.C., F.R.C.S., R.A.F., who had flown from Singapore to attend the meeting. A tribute was paid to the Ophthalmological Society of the United Kingdom.

Blindness was considered as our common enemy. Various ways in which it is most frequent were dealt with as if blindness was an anthromorphic enemy. These ways included congenital cataract, tumour formation and the effects of trauma. Defects in our defence against this enemy were discussed, such as those that occur in our training of the recruits and in our vision of the enemy. It was emphasised that we must see not simply the disease but the individual as a whole, and he in his social and his cosmic setting if we are to obtain a complete view of our patient's problems. The slow evolution of the spirit of medicine through the ages was briefly traced. It was suggested that bureaucratic control could unwittingly interfere with this spirit and blindness ensue.

The victims of blindness and their rehabilitation were considered. It was decided that many of them saw in life what many of us who are "sighted" fail to see. Reference was made to what was called real blindness and to the influence of atomic warfare.

Unveiling of memorial to the late Major Z. Schwartz

A bronze tablet, in perpetuation of the memory of the late Dr. Z. Schwartz, who was killed in action on April 10, 1941, was unveiled. Doctors A. S. Anderson and T. a'B. Travers spoke with

* Received for publication, January 7, 1944.

deep appreciation of the colleague the Society had lost and of his contribution to the establishment of the Medical Eye Service of Victoria. It is intended to hang the tablet in the premises of the Medical Eye Service.

The Relationship between Night Vision Testing and Night Vision Training in Aerial Warfare

Air-Commodore P. C. Livingston described the early experiments carried out by the R.A.F. in night vision and its influence on flying. He traced the gradual development of the rotating hexagon and discussed its virtues and its limitations. The term "night visual capacity" was shown to be very useful. The factors which tend adversely to affect this capacity were considered. Particular attention was paid to anoxia. Its effects on the hexagon test and on the erratic involuntary ocular movements were shown by slides. The night vision screen test was described. Fields were shown to exhibit the results of anoxia, vitamin A deficiency, retro-bulbar neuritis and diabetes. The probable trends of future development were discussed.

The Cure of Heterophoria in Air Crew—Its Clinical and Psychological Significance

Air-Commodore P. C. Livingston, R.A.F. described the changed outlook on the influence of heterophoria on flying. Reference was made to the origin of certain tests and to their usefulness. Their susceptibility to psychological and neuro-muscular influences was considered. The value of orthoptics both before flying training and as a means of rehabilitation was emphasised. Tribute was paid to the work of English orthoptists during the war. Cases of special interest were received and the results of their orthoptic training were described. Speculation was made regarding future developments.

The rôle of Orthoptic treatment

Miss Diana Mann (Melbourne) read a paper which attempted to show types of squint and other defects suitable for orthoptic training. It was assumed that treatment was not justified when results were slow or uncertain. Treatment was most useful for accommodative squints, certain occasional squints, and as an adjunct to operation for certain symptoms of eyestrain which did not respond to correction of refractive error. In such cases lack of voluntary control of convergence was more significant than muscle imbalance. Success always depended on the patient's mental and physical health and powers of concentration.

Concussion Glaucoma

Dr. Arthur D'Ombrain (Sydney) attempted to clarify the views expressed in an earlier paper upon traumatic glaucoma.

The nature of the lesion was defined as a true chronic non-congestive glaucoma, and attention was drawn to the delay in the onset of symptoms, as this was evidence that no gross visual upset occurred at the time of injury. Three types of trauma occurred in these cases, namely:—blows upon the eye, injury to the skull and heavy falls.

These injuries could be regarded as forms of concussion and the resultant chronic glaucoma was suggested to be one of the several possible results of concussion of the ocular bulb. Additional case histories were described.

In conclusion, the hypothesis was put forward that these cases were indicative of a condition which might be named "concussion glaucoma," and that the mechanism of their production was that of a sclerosing lesion initiated by trauma, a fibrosis of the ciliary region or of the venous-capillary bed. This fibrosis is progressive and goes on to the production of the ocular oedema known as glaucoma.

Such a hypothesis explained the remoteness of the history of injury in many of the cases. The lesson was not too hastily to diagnose every case of chronic glaucoma in an eye as a bilateral disease, for it might turn out to be a monocular lesion secondary to a concussional trauma.

A Survey of Retrobulbar Neuritis in Prisoners of War

Dr. S. R. Gerstman, as an ophthalmologist at 115th Australian General Hospital, Heidleberg, at Stonnington Red Cross Rehabilitation Centre for blinded servicemen, was associated with many cases of what was now called retrobulbar neuritis due to avitaminosis. Results of examination were described and vision of all cases at both institutions were summarised. Fundi and fields were discussed and treatment and prognosis were described. Dr. Gerstman gave details of rehabilitation and mentioned the percentage of disability and pensions. Possible liaison with St. Dunstan's of England was also suggested.

Dr. R. B. Maynard who had been a prisoner in Changi camp described the microscopic findings of the ocular tissues he had brought back. Unfortunately his difficulties in preserving the material were such that the detail was not very good. He considered that the changes were such as have been attributed to beri-beri.

Retrobulbar Neuritis and deficiency disease

Dr. Clifford S. Colvin (N.S.W.) gave a short survey of men who had returned from imprisonment in the Halmaheras, Ambon, and Borneo. These men were first seen at Morotai and others came from Changi and Kranji camps where Majors Claffey and Orr had looked after them. The men examined comprised English, Dutch, Australian and Indian troops and a few Dutch women.

It was suggested that possibly an unknown factor in addition to vitamin deficiency was to be looked for in this type of case. Its effects on other parts of the eye and ocular functions were also considered. Dr. Colvin said that one definite case of vitamin A deficiency was encountered responding well to treatment. Some men who lived under similar conditions showed no defects or symptoms, yet their diet must have been similar to those who did get symptoms. Men of all ages were affected by the disease and apparently age was not significant. Some men who said they had blurred vision a year or two previously when examined had normal vision of 6/5.

Dutch civilians, men and women, who had been examined, showed both normal and defective vision. The few children who had been examined showed no defective vision.

Men from Ambon, Dr. Colvin continued, who had no specialist treatment, showed some who were affected mildly and severely and others who showed no effects at all. The rice ration in Ambon was about half that in Singapore. The incidence of defective vision seemed lower in men who had returned from Kuching in Borneo.

The general symptoms were usually numbness of the feet—feeling of pins and needles—aching in toes, feet and arches, with difficulty in walking. Back of the calf tender and knee joints painful—often associated with conjunctivitis aud "glare"—vision then became blurred, oedema of legs and body occurred later, and most patients described themselves as having "beri-beri."

Inherited Retinal detachment

Dr. J. Bruce Hamilton (Hobart) presented a pedigree of inherited juvenile retinal detachment. A total of ten patients, with 20 eyes, of the pedigree were examined. Six patients with a total of ten eyes were refracted and the whole were refracted and the whole were hypermetropic. Of the total ten patients examined five had retinal detachment involving seven eyes. Of these seven eyes, three had pseudo-glioma, one retinitis proliferans, and one a detachment which reattached itself. A further two of the ten patients examined had unilateral complicated cataracts, and loss of projection with undoubted detachments behind them. Dr. Hamilton said it was therefore safe to presume that seven patients and nine eyes were involved with detachments in the pedigree. Of the remaining eleven eyes, one had a retinal cyst with peripheral choroido-retinitis, and three eyes had peripheral choroido-retinitis without retinal cysts. One eye of the twenty examined had aniridia.

Dr. Hamilton then discussed the inheritance of polycystic disease of the kidneys, liver and pancreas, and the inheritence of congenital cystic disease of the lungs. He was able to show a film of one patient from his pedigree with retinal detachment in both eyes and pseudo-glioma who had congenital cystic disease of the lungs in an

advanced state. He asked if members of the Society would enlighten him as to the relationship between congenital cystic disease of the lungs and inherited juvenile retinal detachment. He felt that they were both due to generalised congenital cystic disease involving the eyes and the lungs for at least two reasons:—

(*a*) that the retinal cysts become infected and appeared as pseudo-glioma just as the lung cysts became infected and bronchiectasis ensued and

(*b*) the fact that like lung cysts, retinal cysts ruptured and the detachments re-attached themselves.

Angeoid streaks of the Retina

Dr. J. D. Maude (Sydney) gave a description of cases of angeoid streaks of the retina with pseudo-zanthoma elasticum. Dr. Maude also gave a short review of contributed cases by other members, and discussed the literature.

Pigmentary abnormality in children congenitally deaf following maternal German Measles

Dr. E. O. Marks (Brisbane) said that though incidence of congenital cataract did not rise in Brisbane as in Sydney, Melbourne and Adelaide, there were serious "epidemics" of deafness and cardiac defects. Half the deaf children born in the years 1937, 1938 and 1941, however, showed retinal pigmentation while those born in other years were normal. The appearance resembled a typical form of retinitis pigmentosa.

Intracapsular cataract extraction, its most serious complication

Dr. F. Gregory Roberts (Sydney) said that the condition described consisted of a progressive retraction upwards of the iris following a technically perfect operation. It was not connected with the loss of vitreous at the operation or of any subsequent burst through of vitreous. The types of patient in which the condition occurred were described and treatment suggested.

The Future of Ophthalmology

Dr. K. O'Day (Melbourne) said that because of lack of teaching of the subject, ophthalmology in Australia had always rested on a very insecure foundation. Examinations held in the past had not been very satisfactory, and the facilities provided for training were quite inadequate. Histology should be made a living subject, and a library of slides for the teaching of histology and embryology should be available. Physiology should provide a sound introduction to clinical ophthalmology. The clinical aspect of the subject should be

taught from the patient and not from a book. It must of course rest on a sound basis of pathology. The opportunities available have been neglected in the past. Without a sound basis of pathology, no progress could be made. Adequate direction was essential, said Dr. O'Day, and this could be provided for by a Chair of Ophthalmology at the University.

A clinical meeting was held on Saturday morning, October 26. A series of very interesting cases was demonstrated. Dr. Kevin O'Day demonstrated the rapid method of celloidin embedding and a large number of slides of ocular tissues of Australian animals. Dr. Ringland Anderson demonstrated the projection and the polaroid methods of investigating diplopia. He emphasised the value of "dividing" diplopia into a component for each eye, and he described the association of palsies of one superior muscle of each eye, of one inferior muscle of each eye and of both superior oblique muscles.

Annual Dinner

The Annual Dinner was held at Menzies Hotel, and was attended by 45 members and the following guests:—Air-Commodore P. C. Livingston, R.A.F., Professor P. MacCallum, Professor Sydney Rubbo, Air-Commodore E. A. Daley.

The President announced that Air-Commodore Livingston had accepted honorary membership of the Society. The announcement was received with applause.

The President offered the congratulations of the Society to Dr. N. McA. Gregg, who had received the Shorney Prize, at its first award, for his work upon "Congenital cataract associated with maternal rubella."

Annual General Meeting

The annual general meeting dealt with general business. Particular attention was given to special problems, including ophthalmic education and the future of ophthalmology.

Dr. Darcy A. Williams (New South Wales) was elected President for the ensuing year.

It is proposed to hold the seventh annual general and scientific meeting at Sydney in the week September 1 to 6, 1947.

BOOK NOTICE

Eye Surgery. By H. B. STALLARD, M.B.E., M.D., F.R.C.S. Pp., 444, 338 illustrations. Bristol: John Wright and Sons, Limited. London: Simpkin Marshall, Limited. 1946. Price, £2 10s.

To have written a book of this scope, with such wealth of detail, and to have drawn the majority of the illustrations himself is an achievement of which any ophthalmologist might be proud. To have written it without access to ophthalmic literature, at sea, in military transports and in camps, with all the distractions incidental to active service makes the achievement still greater. In one way, it also enhances the value of the book, because, instead of being presented with a rehash of the often conflicting views of many authorities, the reader is given the results of one man's observations, and the methods he has used to cope with the many and manifold surgical problems presented by the eye and its adnexa. Were the experiences of such a man narrow and limited, this method of describing it would be of little value; but in the present instance, the author is a man of wide experience—both in civil and military fields, and the results of this are gathered together in the volume under review.

It opens with an introductory chapter, which abounds in useful instructions for the ophthalmic surgeon and his assistant, and deals with matters such as the lay-out of the theatre, care of instruments, discipline of the staff and pre- and post-operative care of patients. This is followed by a chapter on anaesthesia and analgesia, and then come some 130 pages concerned mainly with plastic surgery of the eyelids. In addition to describing operations for the relief of ptosis, ectropion, entropion and other deformities, the author deals in considerable detail with reconstructive surgery for war injuries. This is regarded by many as the proper domain of the plastic surgeon, but a good case is made out for the ophthalmic surgeon doing this work, though he should have an apprenticeship with a plastic unit before attempting it. The same question comes up with regard to dacryocysto-rhinostomy, which some regard as an operation for the rhinologist. Although it would probably be unwise for the ophthalmic surgeon to attempt it without having previously seen the operation, he should be able to carry it out by following the careful description and clear illustrations given in the letterpress.

The remaining chapters of the book deal with the lacrimal apparatus, the extra-ocular muscles, the conjunctiva, cornea, anterior chamber and sclera, the iris, the lens, glaucoma, the retina, choroid and vitreous, traumatic surgery and the orbit. Throughout these, the same meticulous care is observed in the illustration and description of the operations. Each is preceded by

a list of the instruments required, and an account of the method employed for producing anaesthesia or analgesia. Although this entails a good deal of repetition, it has the advantage of giving a complete description of each operation, which is useful for hasty reference. The author never hesitates to incorporate his own views, and is apt to give these at times in a dogmatic fashion—an example being the statement that, in severe cases of squint, operation is done between the ages of 2 and 4. In the reviewer's opinion, such dogmatism is justified when one takes into consideration the purpose of the book; but it might afford a subject for criticism by some readers.

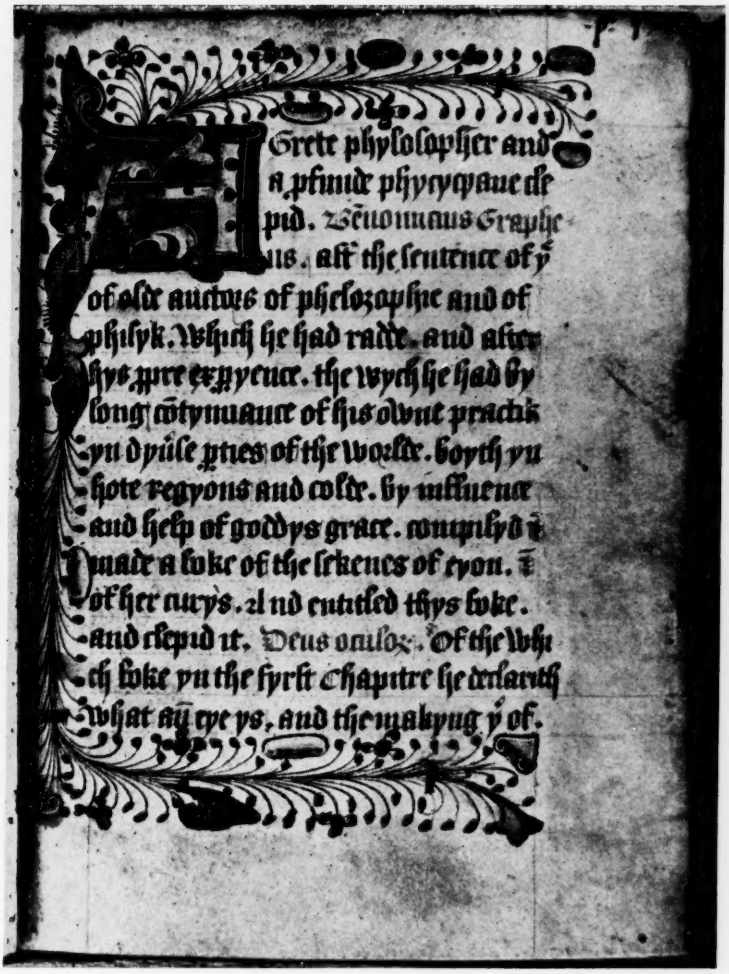
"Eye Surgery" contains much original matter, which has not appeared before in book form—particularly striking examples are afforded by the description of the author's methods of extraction of intra-ocular foreign bodies by the posterior route, of implantation of radon seeds far back on the eye for intra-ocular neoplasms, and of his corneo-scleral stitch in cataract extraction. In describing the extra-capsular method of performing this operation, it is recommended, after applying and closing the capsule forceps, to displace them down, and then to the temporal and nasal sides before removing them. Such a manoeuvre has led at times to loss of vitreous, whereas this catastrophe does not occur if no manipulations are made preliminary to taking the forceps out of the eye once they have grasped the capsule.

The chapter on the orbit contains much useful information, and an excellent description of a modified Krönlein's operation, which, however, would be easier to follow if a diagram of the bony structures were included, showing the lines along which they are divided.

The function of a review of a book is to indicate the characteristics and contents, so that readers can decide whether or not they need to possess it. In the present instance, the characteristics are lucidity of description, meticulous attention to detail, incorporation of valuable material not heretofore obtainable in book form and sincerity, with a certain healthy degree of dogmatism in its writing. As a result, the reader of this volume, given reasonable experience in ophthalmic surgery, should be able to perform any of the operations described in it, even if he has not had the opportunity of seeing them done by others.

For many years a need has been felt in this country for an authoritative English book on ophthalmic operative surgery, and this need has now received ample satisfaction.

We would like to congratulate 'Henry' Stallard on having achieved what might seem the impossible—namely, providing us with corn from Egypt and manna from the desert.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Benevenutus Grassus. Page 1.

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CORRESPONDENCE

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

DEAR SIRS,—

"De Oculis, by Benevenutus Grassus of Jerusalem."

In 1929, the late Casey A. Wood published an English translation of the first printed edition at Ferrara, 1474, A.D., of which Incunable, he gave illustrations of the first, 17th, and last pages; and an illustration of the "Explicit" and last folio of an Old English codex from the Ashmole collection in the Bodleian Library, Oxford.

Wood stated that that was the only English translation he was able to find, apart from his own translation. The old codex he found was a fragment of six pages.

During my investigations for editions of Arabic ophthalmology, last year in the Hunterian Library of the University of Glasgow, I came across the following,

Manuscript 303. Beneventi Graphei (Grassi).

De VSV Oculorum, Opus in Linguam Anglicum translation ,68 pages.

> Vellum binding; 68 pages well written in single columns, 15 lines each 4½ by 3⅜ inches; gilt illuminated capitals. The late editor of the Catalogue of the Manuscripts, placed the date of this MMS. in the XV century.

At the forthcoming Glasgow meeting of the Ophthalmological Society of the United Kingdom at the end of March, 1947, the President desires this volume to be displayed, with other rarities, showing editions recording early discoveries; and the Librarian, W. R. Cunningham, Esq., M.A., LL.D., has given his consent to a demonstration in the Hunterian Library of these valuable and beautifully illustrated volumes, at the coming meeting.

He has obtained for me a photograph of the first and last pages of this old English edition, which I trust you will be able to print along with this letter.

Yours truly,

W. B. INGLIS POLLOCK.

21, WOODSIDE PLACE,
GLASGOW, C.3.
November 29, 1946.

THE "NORMAL" IN THE SYNOPTOPHORE

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

DEAR SIRS,—The interesting article by Lewis in your issue of December (*Brit. Jl. Ophthal., Vol. XXX, p. 749*) reveals some results which are not in accord with my own experience.

Comparing the distribution of Maddox rod measurements with that in a series (which I hope to publish soon) of 1269 cases, certain features are apparent. Lewis' distribution is appreciably cramped at the greater levels of exophoria and esophoria. The mean is slightly more esophoric than in my series (+0·895 compared with +0·508). Using the Chi-squared test to compare distributions, the chance of obtaining Lewis' distribution from a population represented by my own series is less than one in ten thousand. This suggests that the Maddox rod measurements in Lewis' paper are not sufficiently reliable for conclusions to be drawn as to the relation between the Maddox rod and the synoptophore findings.

I venture to suggest that the failure to check the zero on the synoptophore is a matter of some significance in view of the conclusions drawn, since I do not think that there is, on the face of it, reason to suppose that the synoptophore and the Maddox rod measure different qualities of heterophoria.

I would also offer the following suggestion for the discrepancy between the findings of method A and method B with the synoptophore (and therefore for the bifurcation of the hump in the distribution curve:— || bi

Intelligent anticipation would inevitably result in coincidence of the images being signified before true coincidence had taken place. With the slides used such anticipation could well be subconscious.

It is, I think, a fairly well established rule that the more simple the instrument, the less extraneous factors are introduced into a measurement, and thus the more likely is it that the measurement is truly that of the function being measured. The synoptophore is an instrument of recent development in comparison with the Maddox rod, and I have shown earlier (Cridland, 1940) that results with the Maddox rod can be made reliable by attention to details.

Lewis' investigation is a valuable contribution to synoptophore work, and my criticism seeks only to prevent too great reliance being placed upon the conclusions as to correlation between different instruments.

Yours faithfully,

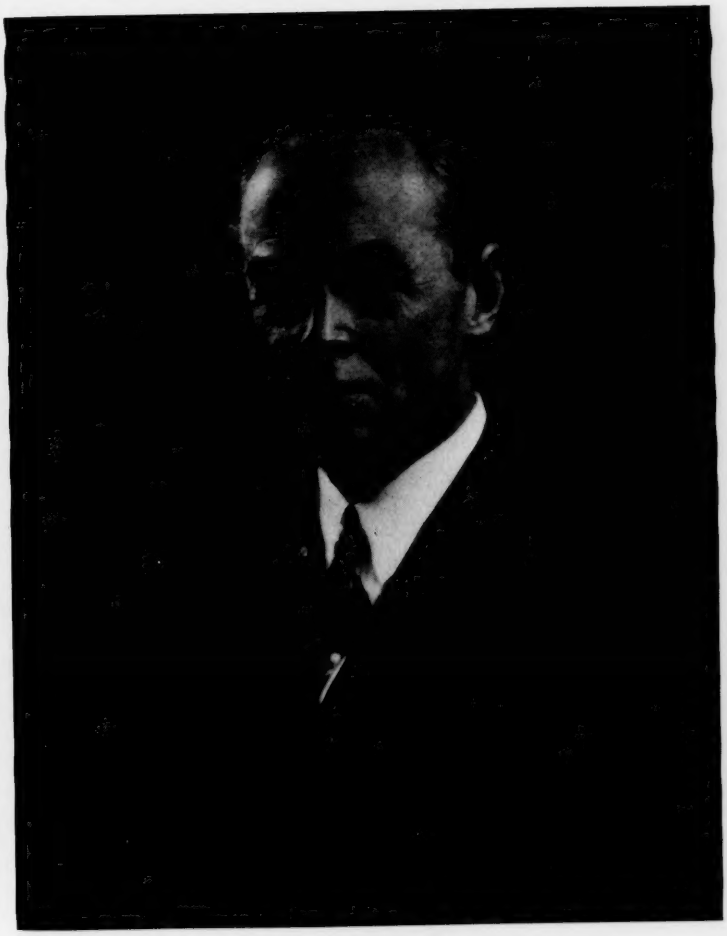
NIGEL CRIDLAND.

SOUTHSEA, HANTS.
January 7, 1947.

MYOPIA AND PSEUDO-MYOPIA

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

DEAR SIRS,—In the article "Myopia and Pseudo-Myopia" by J. P. Spencer Walker which appeared in the December issue of the Journal he mentioned the case of a boy, aged 13½ years, who had



SIR RICHARD CRUISE.

been rejected for Dartmouth owing to "myopia and myopic astigmatism." He found that the refraction under atropine was R. and L. +0·25 D.Sph. $\bar{c}$ +0·25 D.cyl. vertical. He does not state whether or not as a result of his findings the boy was subsequently accepted for Dartmouth.

It would appear to me that it would not be in the boy's interest to be accepted, because it is probable that when he reaches the age to graduate from the college he would have become myopic, and might, therefore, be rejected at this late stage of his career. I would refer Mr. Spencer Walker, and anybody else who is interested in the subject, to an article in the American Archives of Ophthalmology of April, 1941, on "The Development and Prevention of Myopia at the United States Naval Academy" by Reginald Hayden, M.D. His researches would indicate that it is unwise for any boy to enter a naval academy who has not got at least a reserve of 0·5 D. of hypermetropia when refracted under a cycloplegic, and that visually such a candidate stands no better than an even chance of obtaining a commission in the line of the navy on graduation.

Yours faithfully,

F. S. LAVERY.

45, FITZWILLIAM SQUARE,
DUBLIN.
December 18, 1946.

OBITUARY

SIR RICHARD CRUISE, G.C.V.O.

SIR RICHARD CRUISE, G.C.V.O., joined the Staff of the Royal Westminster Ophthalmic Hospital, in 1909, the Committee of Management in 1923 and was appointed Consulting Surgeon in 1936. From 1918 to 1936, he was Surgeon in Ordinary to their Majesties King George V and Queen Mary and remained Queen Mary's oculist to the time of his death.

In 1934, he founded the Cruise Open Scholarship, of one hundred pounds per year, with a capital of £2000, which he had given and collected from his patients, to encourage research in Ophthalmology, at the Royal Westminster Ophthalmic Hospital. So far there have been three holders. Papers on the work done have been published in the *British Journal of Ophthalmology* from time to time.

Sir Richard was a first class operator especially interested in cataract extraction and glaucoma. For the former, he used the simplest possible technique but every detail even of "stance" was considered and perfected over years of practice. He used to teach

that one must "address" the eye as one would a golf ball. He strove to obtain the co-operation of his patient, saying that he was to consider himself, not the victim of a mutilating operation but the first assistant in a very delicate piece of craftsmanship. His results were almost invariably perfect.

In cases of glaucoma his work with the Bishop Harman scotometer and Schiötz tonometer, was a revelation to those unaccustomed to their repeated use.

He was for many years dissatisfied with the results of operative treatment for this disease and tried many techniques to obtain permanent drainage. At nearly the end of his life he was able to obtain an eye from a patient who had died an hour or two previously and prove that the drainage channels which he had produced by operation many years ago, had become lined by endothelium and so remained permanently open.

Sir Richard was always thoughtful for and helpful to his juniors and was ready to spend time and tireless patience in teaching them his own meticulous care in operative technique and persuading them to repeat these details themselves, in practice.

On the Committee of Management, he was a valued friend to the Medical Staff. While ready to champion any cause, he believed to be just, he had a clear idea of what could or could not be done. The excellent relations that maintained between the two Committees for many years were largely due to his tact and judgment.

He derived great pleasure from an outdoor life and regarded it as necessary to keep absolutely fit, if he was to do his best work as a surgeon. He was an excellent shot, fine cricketer, good golfer and rode well to hounds on his horse "War Gratuity." With him he won many hunt point-to-points.

During the twenty five years I worked with him, I came to rely upon his opinion as to what it was best to do in the "difficult" case with which one is faced from time to time, and he never failed me.

SIR WILLIAM J. COLLINS, K.C.V.O.

SIR WILLIAM JOB COLLINS died at his home in London on December 12, 1946, at the great age of 87 years. He was the eldest son of Dr. W. J. Collins, a London doctor, and the elder brother of the late E. Treacher Collins. Both brothers were educated at University College School and had among other contemporaries Mr. Percy Flemming and Ernest Clarke. Sir William's academic career was a distinguished one, both at School and at the University of London. He went to St. Bartholomew's Hospital for his medical training and graduated M.D. London in 1882, M.S. in 1885 and took the F.R.C.S.Eng. a year previously. He maintained his interest in the University all his life and was at times a member of the Senate and Vice-Chancellor.

Sir William Collins was ophthalmic surgeon to the Temperance Hospital and at one time Surgeon to the Royal Eye Hospital. He joined the Ophthalmological Society of the United Kingdom in 1886, but never held office and retired some years ago. His outside interests were so many and varied that he did not often attend the Society's meetings. In this there was a marked contrast between the brothers, for Treacher Collins hardly ever missed a meeting and apart from his work had few outside interests. Thus, it is not as an ophthalmologist that Sir William will be remembered, but for his work on the L.C.C. and as member of Parliament. How few to-day remember that London largely owes its ambulance service to his untiring efforts. District Nursing was another concern in which he took great interest and the Chadwick Trust.

NOTES

Death

AS we go to press we learn with great regret of the death of Sir Arnold Lawson. We hope to publish a memoir in a later number.

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Honours

IN the New Year's Honours List we are pleased to see that the C.V.O. has been conferred on Mr. F. A. Juler.

MR. EUGENE WOLFF has been elected an honorary member of the Société belge d'Ophtalmologie.

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Appointment

MR. J. D. MARTIN-JONES has been appointed Ophthalmic Surgeon to the Salisbury General Infirmary, Wilts.

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The British Orthoptic Journal

THE third number of this journal is just as interesting as its predecessors, if not more so, and it possesses the same freshness of outlook. Those who are inclined to scoff at "exercises" might be interested to read Miss Sparrow's paper on the "Art of Seeing," and Miss Mayou's on "Convergence Deficiency," while a dilemma, which was frankly inexplicable by the authors of an article in a recent number of the *American Archives*, is neatly resolved by Miss Swift and Miss Balkwell. It concerns the apparent difference in distance of red and green lights, which may often be noted in, say, the "Friend" test.

That orthoptics is coming into its own would seem to be shown by the provocative statement of one ophthalmic surgeon, that "the surgeon must work for the orthoptist—not the orthoptist for the surgeon."

The remainder of the articles are not of this character, however, though some of them make a justifiable plea for early operation in cases of squint.

It is impossible, within the limits of a short review, to deal with each of the seventeen papers by ophthalmic surgeons and orthoptists, but we cannot conclude without mentioning "Doubts and Difficulties" by Miss Exner, which, from a delightfully modest beginning —"I very nearly did'nt come,"—goes on to give much useful information, and is full of sound common sense.

The circulation of this journal is at present small, but the material in it is of such value, that we feel the venture of publishing it should be encouraged, and that it would not be out of place to state that copies, 5/6 each, including postage, may be obtained from the Publishers, Wilding and Son, Ltd., Castle Street, Shrewsbury.

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National Society for the Prevention of Blindness. Prize Subject: Glaucoma

THE National Society for the Prevention of Blindness announces that papers submitted for the glaucoma prize of $500 offered in 1944 did not conform to the criteria set up by the ophthalmological committee selected to award the prize. Therefore, the prize is again offered for the most valuable original paper adding to existing knowledge about the diagnosis of early glaucoma or the medical treatment of non-congestive glaucoma. The criteria may be secured by writing to the National Society for the Prevention of Blindness, 1790 Broadway, New York 19, N.Y.

Papers may be presented by any practicing ophthalmologist of the Western Hemisphere and may be written in English, French, German, Italian, Spanish or Portuguese. Those written in any of the last four languages should be accompanied by a summary in English. Closing date for receipt of papers is December, 1947.

The award will be made by the Society with the guidance of an ophthalmological committee composed of Doctors John N. Evans, *Chairman*; Frank C. Keil, Daniel B. Kirby, John M. McLean, R. Townley Paton, Algernon B. Reese, Bernard Samuels, Kaufman Schlivek, Willis S. Knighton, Manuel Uribe Troncoso, David H. Webster.

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Western Ophthalmic Hospital

MR. LINDSAY-REA retired from his post on the staff of the Hospital on December 13, 1946, after 25 years service. His colleagues made a presentation to him on his retirement.